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OBSTETRICS THROUGH THE AGES.[1]

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FOR the purpose of this inaugural lecture on obstetrics through the ages, I have divided time into four epochs: the first, from ancient times to 1550; the second, from 1550 to 1700; the third, from 1700 to 1850; the fourth, from 1850 to 1950. The first epoch extended from the dawn of medicine to the rise of Ambroise Paré, and was dominated by the teachings of Galen. The second epoch had as its main influence Ambroise Paré and his pupils. The third epoch was the golden age of the obstetric forceps and in Great Britain the teachings of Smellie were dominant, while the fourth and last epoch was the age of antisepsis, asepsis, anæsthesia and safe Cæsarean section.

The First Epoch, to 1550.

"That woman bringeth forth her children in sorrow" appears to be a law of the function of reproduction imposed upon the women of all tribes, countries and times. From the remotest periods the occurrence of human birth has always excited something of alarm and sympathy. From the dictates of such sympathies and apprehensions, the first rude efforts in the art of midwifery took their origin.

In the earliest ages, when the human race lived according to natural instinct, women rendered to one another such kindly services as the function of natural labour required. At this time the menfolk would welcome the child, but were indifferent to the process of bringing the baby into the world. Later—and this represented an important cultural advance—men did not forsake their women in labour, but remained with them and helped them; an interesting development of this period was the practice of couvade. Under this system, after the delivery the men went to bed for varying periods with the baby and the woman carried on with her work. In the next stage of cultural development the husband did not actively assist in the delivery but played a watching role, and finally the husband was excluded completely—the delivery being regarded as purely a female concern. In time, someone in the community professing to be more intelligent or experienced than her neighbours in such matters was granted the status of midwife.

The process of birth was repeatedly observed, and the simple and obvious things were done to help the woman in labour. Normal births proceeded normally. Abnormal births were due to demons. Labour was thought to be a voluntary act on the part of the child, which was supposed to be anxious to escape from its confined quarters. Offers of food were made to entice the child out, while another method, still popular with American Indians, was to take the labouring women into the open and to get a horseman to appear to "ride down" the baby—the horse turning aside

[1] Inaugural lecture, delivered on August 9, 1951.

at the last moment. This was intended to make the child hurry up its delivery.

The early literature is very limited, and although the oldest medical manuscript in existence—"The Ebers Papyrus" (1550 B.C.)—mentions treatment to the newborn, no reference is made to labour. The Bible, however, does mention it, for Genesis XXXV, verses 16 to 18, says:

> . . . and Rachel travailed, and she had hard labour. And it came to pass, when she was in hard labour, that the midwife said unto her, Fear not, thou shalt have this son also. And it came to pass, as her soul was in departing (for she died), that she called his name Benoni . . .

Rachel was comforted by the midwife that all would be well, whilst she was dying probably from a ruptured uterus.

A very interesting case of twins is reported later in the same book, Chapter XXXVIII, verse 28. Thamar was giving birth to twins when an arm prolapsed. The midwife tied a scarlet thread around the baby's wrist to designate it as the first born, labour proceeded, the arm withdrew inside the mother and the other child was born first.

The Book of Exodus makes it plain that the ancient Hebrew midwives were familiar with the value of posture during labour and that they used the obstetric stool.

> And the king of Egypt spake to the Hebrew midwives, of which the name of the one was Shiphrah, and the name of the other Puah: and he said, When ye do the office of a midwife to the Hebrew women, and see them upon the stools, if it be a son, then ye shall kill him, but if it be a daughter, then she shall live. But the midwives feared God, and did not as the king of Egypt commanded them, but saved the men children alive. And the king of Egypt called for the midwives and said unto them, Why have ye done this thing, and have saved the men children alive? And the midwives said unto Pharaoh, Because the Hebrew women are not as the Egyptian women; for they are lively, and are delivered ere the midwives come in unto them.

The change from the obvious crude mechanical assistance, in which the abdomen was often pounded to help the delivery, to experienced assistance was an appreciable advance. The next step forward was even greater, for now, besides the experienced midwife, the operative obstetrics of the priest-surgeon appeared. This occurred probably as follows. The midwives, realizing their limitations, called in a surgeon or a physician. These men were priests concerned with the sufferings and physical afflictions of mankind. Thus midwives preceded surgeons in their origin, as surgeons did obstetricians. In the thousands of years that comprise this first epoch, everything done in obstetrics was done by midwives or surgeons. The first detailed medical knowledge that we have is that of the ancient Greek civilization. It is interesting to recall that Æsculapius, the Greek god of medicine, was born by Cæsarean section performed by his father, the god Apollo, on his mortal mother Koronis as she lay on her funeral pyre. Gradually the priest-surgeons divided into two, the priests devoting themselves to the religious side of the work and a school of lay assistants taking over the medical and surgical treatment of patients. It was from these lay assistants that the Greek schools of medicine arose and the most famous one was established at Cos. This school, founded by Hippocrates about 400 B.C., taught that head presentations were favourable and that transverse and foot presentations were unfavourable. Turning the baby so that the head presented (or cephalic version) was performed and delivery was then effected by the use of hooks. Greek midwives had to be mothers and past the age of child-bearing. One mentioned by Plato was a brave burly midwife named Phænarate. She had a child in order to qualify as a midwife and his name was Socrates. Midwifery came to Rome partly from Greece and partly from the Alexandrian schools. Whilst Greece slipped into obscurity and Alexandria developed the arts and sciences, Rome was founding a great empire. The first physicians in Rome were Greek and Roman. Obstetrics was borrowed almost entirely from the Greeks—that is, it was Hippocratic.

Soranus, who was born in Ephesus, studied at Alexandria and practised in Rome between A.D. 98 and 138. He was the first specialist in obstetrics and gynæcology. He understood his subjects, and his book was the most important treatise of ancient times. He gave a clear description of the uterus (or womb) and its appendages; prior to this the uterus was considered to be an animal. He anatomically defined the position of the child in its mother. He taught the midwives to perform vaginal examinations—he was the first to describe turning of the unborn child from the head presenting to the buttocks (podalic version), and to describe the signs of the onset of labour. As well, he described the management of normal labour and defined the causes of difficult labour. His writings on pædiatrics were very fine. The first popular "question and answer" book for Roman midwives, written by Moschian in the sixth century A.D., was based on the work of Soranus. It was ultimately from Soranus that Rosslin derived his *"Rosengarten"* in 1513 and Raynalde his "Byrth of Mankynde" in 1545. Soranus's technique brought the child-bearing woman more care and kindness and much more skilled attention that she had had before. He discouraged reckless application of remedies to hasten labour, and of brute force in the extraction of the baby in slow labours. He taught rational midwifery and child care, based on knowledge and divorced from superstition.

Galen was born in Asia Minor in A.D. 130, eight years before Soranus died; he studied medicine at Alexandria and then returned to his home in Pergamus. Later he went to Rome, where he attended the Roman emperors including Marcus Aurelius. He died about A.D. 200, leaving a library of some 400 works; 83 of his larger volumes are still in existence. He did not write a formal treatise on obstetrics, but there are many references to the subject in his writings. For difficult labour he advocated cephalic version and extraction by mutilation if necessary. His knowledge of female anatomy was not correct, as he had never dissected a human female; his subjects were female animals, and so he considered the uterus to be a double organ. Soranus had stated that a woman menstruated in general every month, but Galen considered that the moon controlled the monthly period in women, and this latter view was accepted for centuries. He stated that the fœtus was passive during labour. This was one of his important and true teachings that was forgotten, his inaccurate observations never being questioned. Galen was an efficient dogmatic rationalist, the inquiring genius of Hippocrates having been forgotten. The works of Soranus, who was in a direct line from Hippocrates, were set aside till the sixteenth century, and the views of Galen the dictator held sway.

The work of Galen represents the highest point attained by the medical sciences in Rome. As time went by the centre of interest drifted from Rome to Byzantium on the shores of the Bosphorus. This was a Greek city, and in 328 its name was changed to Constantinople by the Emperor Constantine, who had captured Rome sixteen years previously. Constantine was a convert to Christianity, and consequently this became the official religion. Galen was adopted by the church and his views were sacrosanct.

The works of Galen and sometimes those of Soranus were copied by Moschian and other writers in the era of the Byzantine Empire.

In the middle of the seventh century the last of the great Greek copyists was born—Paulus of Regina. Cephalic version was still the treatment of choice in difficult labours, and then if delivery was impossible the child was extracted by sharp hooks. There was no mention of podalic version in the books that Paulus wrote. The teachings of Soranus had been forgotten, and this method was not used again until it was reintroduced by Ambroise Paré. Therefore obstetricians in these times became experts in mutilating operations on the baby, for they were rarely called in by the midwives until the patient was *in extremis* and the baby dead. Cæsarean section was performed only on the dead or the nearly dead.

The Byzantine Empire gave way to the Arabic Empire, and although with the capture of Constantinople the great library was burnt, most of the more important works were recovered and stored in the Royal Library in Bagdad. The

medical works of Greece and Rome, which the copyists of Constantinople had preserved, were then translated into Arabic. As the Arabic physicians were unable to dissect the human body, Galen's beliefs were never questioned. Women were secluded, and the care of the child-bearing woman was exclusively the midwives' province. However, the midwives were instructed by the doctors, and some of the physicians were called in to attend women in childbirth. The translation of the works of Paul of Regina was the standard text-book. Paul became known to the Arabs as "the obstetrician".

The Arab Empire produced many great physicians and surgeons, but very little advance in obstetrics was seen in this era. One advance was made, and that was in the use of the fillet, or pieces of tape, for extracting the baby. Some claims have been made that the Arabs used forceps, but this has not been conclusively proved.

In 1258 the Tartars sacked Bagdad and the Greek manuscripts were lost. However, the Arabic texts were still in existence. These versions were brought back in the booty of the Crusaders and translated into Latin.

Towards the end of the first epoch (that ended about 1550) midwives had still full control in the birth room. Medical schools were flourishing at Salerno and Padua in Europe. Physicians and surgeons were affected by the intellectual awakenings of the Renaissance. There were movements to escape from false tradition. The first of the line of great liberators was Vesalius (the founder of modern anatomy), who led the way to reform in all branches of medicine. He was born in Brussels in 1514, and his epoch-making work "*De humani corporis fabrica*" appeared in 1543. For the first time a true and accurate description of the pelvis was given. Ambroise Paré, who was then aged thirty-three years, with this anatomical knowledge as a background, was able to make a fundamental change in the art of obstetrics and bring to a close the first epoch.

The Second Epoch, 1550 to 1700.

In 1500 the wife of Jacob Nufer, a Swiss sow-gelder, went into labour. After four days in labour she had been attended by 13 midwives, all of whom gave her up in despair. Finally, Jacob delivered her by Cæsarean section. Afterwards she had six children normally, and lived to the age of seventy-seven years. This is claimed as the first Cæsarean section to be recorded with a live mother and child.

Fifteen successful Cæsarean sections were reported in the sixteenth century. Despite these successes the operation was still confined to those women who were nearly dead or had just died. In 1532 Rosslin, a physician, published the first European text-book for midwives called "The Rose Garden of the Pregnant Women's Nurse". It was dedicated to his patroness the Duchess of Brunswick. The important sections of his book were taken directly from Moschian, who had copied Soranus. In this way the teachings of Soranus reached the midwives of Germany and later England; the "Byrth of Mankynde", the first printed midwifery book in English published in 1540, was a translation by Jonas of Rosslin's book. This was a standard work for nearly two hundred years until Smellie's great treatise appeared. Dr. Raynalde was editor of the earlier editions. There were no anatomical plates in the first edition, but copies from works of Vesalius appeared in the 1545 edition. The latter edition was better known as "The Women's Book". The obstetric stool was shown in all editions, as were the "Byrth Figures" (Figures I, II, III, IV).

Ambroise Paré was born in 1509 of poor parents. His education was undertaken by the parish priest; he was apprenticed to a barber surgeon and then went to the *Hôtel-Dieu* in Paris to perfect himself in surgery. This hospital had been founded in A.D. 641, and when Paré reached it it had 1200 beds. At the age of twenty-seven years he joined the army and travelled far and wide; he became an experienced surgeon and gained a wide reputation for the manner in which his amputation wounds healed. He reintroduced the ligature to control hæmorrhage and abandoned the use of boiling oil after amputation. He translated the "*Fabrica*" of Vesalius into French and wrote two obstetrical papers. The first appeared in 1551 and described the operation of podalic version. Paré did not claim any originality in this, but said he had seen it practised by the master barbers and surgeons in Paris. The second was devoted to the induction of labour in hæmorrhage before childbirth. The reintroduction of version saved many thousands of mothers of the type previously left to die or subjected to mutilating operations to remove the child. Paré's own daughter was delivered of one of her children by internal version. Paré also noted the move-

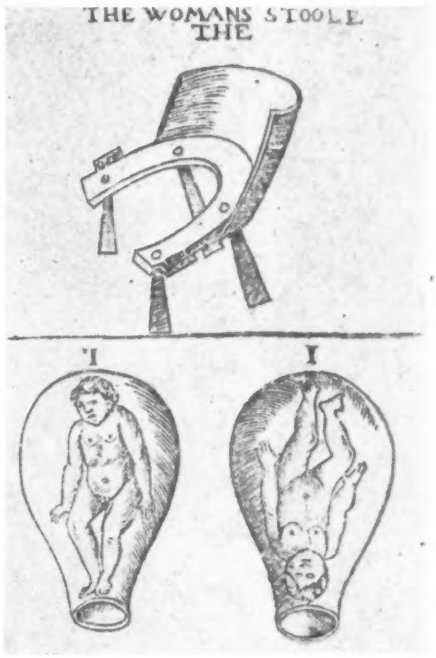

FIGURE I.

ments of the fœtus in the uterus. He was opposed to the operation of Cæsarean section because of the bad results that he saw following the operation.

Smellie acclaimed Paré as "the famous restorer and improver of midwifery". Paré revived podalic version at a time when an obstetrician was still called in only towards the end of a difficult labour; prejudice remained high against the man-midwife. It is strange that he was able to believe the story of Dorothie, who subsequently gave birth to 20 children. He did discount the story of the Countess Margaret, who was said to have given birth to 365 infants, 182 males and 182 females, the males being called John and the females Elizabeth; the odd child was an hermaphrodite. Paré was the greatest figure in Renaissance France and the father of modern obstetrics.

Scipione Mercurio was born in Rome in 1540 and studied medicine in Padua and Bologna. He was a keen anatomist and introduced into Italy the operation of Cæsarean section on the living patient. He published the first printed illustrations of the operation as a life-saving procedure. Figure V shows the patient half reclining on a canopied bed; four males are holding her down; the incision is marked in ink. The second picture shows the child being extracted. The indications for the operation were clearly laid down by him. The state of fitness of the patient before operation was taken into account. The uterine wound was not sewn, but the abdominal wall was.

The teaching of the French school was dominant in the seventeenth century; podalic version with manual extrac-

tion replaced the old method of delivering the child by traction with sharp hooks. During this time forceps were unknown outside the Chamberlen family, but various types of extractors were used. These instruments were designed to open up the birth canal prior to forcible delivery or crushing of the baby's head.

In this epoch the first challenge to the supremacy of the traditional midwives came. Louis XIV engaged a male midwife, Jules Clément, to deliver his mistress. The term *accoucheur* was used to describe him.

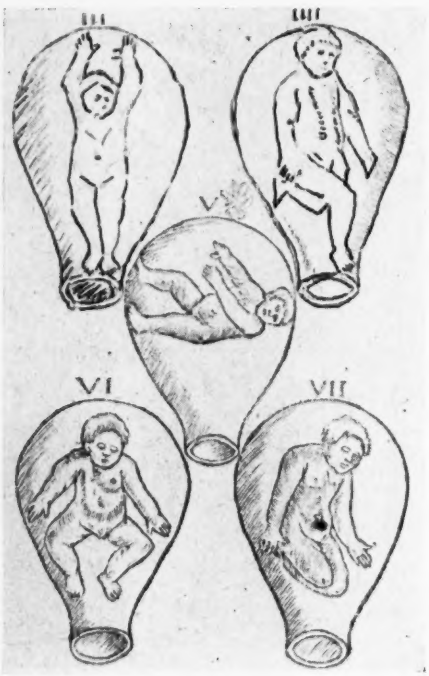

Figure II.

In the seventeenth century, at the time when modern science was beginning, the Royal Society was formed in Great Britain. The renaissance of midwifery in England was later than in France, Germany and Italy. The "Byrth of Mankynde" had been published, and some English translations of Ambroise Paré's work were available. The first original English work in obstetrics was published by William Harvey, and made him the undoubted father of British midwifery.

Harvey was born in 1578, and after a medical education at Padua he returned to Cambridge, where he took the degree of doctor of medicine. His work on the circulation of the blood was published in 1616, and in 1628 he produced *"De motu cordis"*. He was physician to King James I and to King Charles I. In 1651 he wrote the book *"De generatione animalium"*, in which there is a chapter, *"De partu"*, on labour. Obstetrics at this time was regarded as the inferior branch of medicine; physicians would not attend any obstetric patients and only a few surgeons would do so. There was no science and very little art in obstetrics. Doctors acquired such knowledge as they had voluntarily, by reading the scanty literature, or involuntarily, by the experiences forced on them when they were summoned by midwives to desperate cases. Harvey, although primarily an anatomist, concentrated more on function than on form, and as far as obstetrics was concerned his interest was in the function of the reproductive organs. He gave a clear account of the involution of the uterus after childbirth. It was he who inspired the midwives and instructed them that they must have "patience and gentleness". Harvey did practise obstetrics, and according to the writings of his friend Willoughby, "Dr. Harvey's learned observations about the birth ought to be esteemed for their worth and goodness. I know none but Dr. Harvey's directions and method".

At this time in Great Britain the College of the Faculty of Physic was flourishing (in 1851 it became the Royal College of Physicians); the midwives were instructed by the physicians and were licensed by the bishop, not because of any real interest of his in obstetrics but because of the church's interest in the baptism of the child.

In 1569 Dr. William Chamberlen, "a Huguenot", landed at Southampton. The story of the Chamberlens will be told later in this lecture.

And so the second epoch passed—Rosslin in Germany, Paré in France, Mercurio in Italy, and Harvey in England, all attended women in labour and each in a different way brought the practice of midwifery out of the dark ages.

The Third Epoch, 1700 to 1850.

Although the third epoch begins in 1700, we must go back over a hundred years and look at the Chamberlen family tree, for the Chamberlens are generally acknowledged as being the inventors of the obstetric forceps.

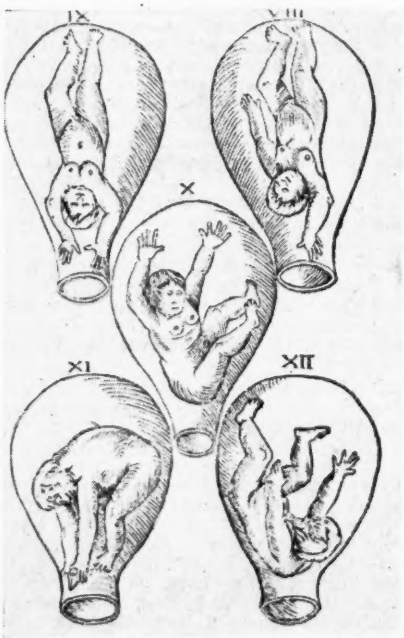

Figure III.

Dr. William Chamberlen came to Southampton from France in 1569, just before the massacre of Saint Bartholomew's Eve. Over 50,000 people were slaughtered at this time; the only Huguenot who survived in France was Ambroise Paré, and he was sheltered in the King's own room for three weeks during the massacre. William Chamberlen practised at first in Southampton and later in London. He died there in 1596.

William had two sons who practised medicine, Peter I, the first-born, and Peter II, the fifth and last child. They were both members of the Barber Surgeon's Company and both practised in London. As they did not have an Oxford or Cambridge doctor of medicine degree, they were not eligible for the Fellowship of the College of the Faculty of Physic and so were often in conflict with the College

for practising medicine. Surgery was their lawful domain —Peter I was the Royal Obstetrician to Anne, the Queen of Charles I. He was imprisoned in Newgate by the College of the Faculty of Physic for misconduct, but Queen Anne and the Archbishop of Canterbury secured his release later. Peter II was also in trouble with the College of the Faculty of Physic because he wanted the State to define the amount of instruction midwives should have. The

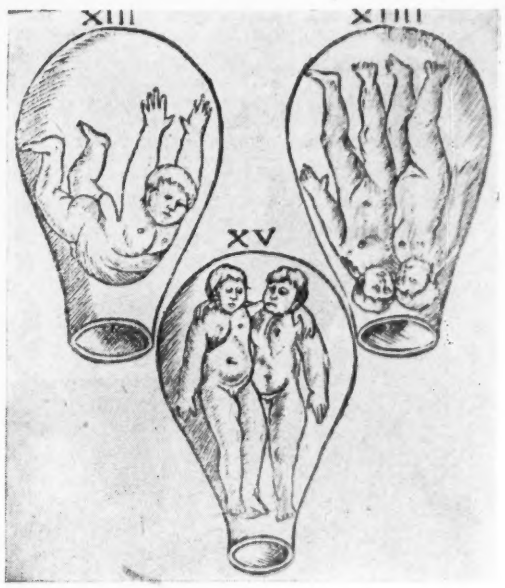

FIGURE IV.

College suggested that before the bishops gave licences the College should instruct and examine the midwives; this was never put into practice. He was also brought before the College for boasting that he and his brother and none others excelled in difficult labours—an allusion to the forceps.

Peter the younger had eight children. His eldest was also called Peter, or Dr. Peter Chamberlen as he is sometimes known, or Peter III. He held the degree of doctor of medicine of Oxford and Cambridge, and in 1628 was made a Fellow of the College of the Faculty of Physic, the body which had so often censured his father and uncle. Peter III also attempted to help in the organization of midwives, having succeeded his uncle as Obstetrician to the Court and Physician-in-Ordinary. These posts he continued to hold at the Restoration, although in 1649 his name was removed from the list of Fellows of the College of the Faculty of Physic. He retired to a home in Essex and died in 1683. His wife hid his letters, trinkets and "The Secret" in the attic of her home. These were not found until 1813, when the Chamberlen secret was finally revealed.

Dr. Peter Chamberlen had 14 children by his two wives, of whom Hugh the eldest, Paul the second son, and John the fourth son practised midwifery, and all used "The Secret". John and Paul both practised obstetrics, but did nothing to further the art. Hugh, however, did probably more than any other member of the family. He held the Bishop of London's licence to practise midwifery; he was the Obstetrician to the Court of James II and to Mary. In 1670 he went for a trip to Paris at the time when Mauriceau (Paré's pupil) was at the height of his fame and *accoucheurs* were popular. Mauriceau was offered the secret instrument, but before paying for it he asked Dr. Hugh to demonstrate its use on a badly deformed dwarf, well on in labour. He applied the forceps to the baby's head, but after three hours of unceasing efforts he was unable to deliver the child. The dwarf died the following day and Mauriceau declined to buy the secret —which he, by the way, did not see. Chamberlen bore him no ill-will, for he translated Mauriceau's book on obstetrics into English and earned a small fortune by this means. It is in this book that the first mention in writing of the forceps was made by a Chamberlen. He stated that his father (Peter III) and his brothers had long practised

FIGURE V.

The first and second stages of Cæsarean section as depicted by Mercurio Scipione in his *La Commare o Riccoglitrice* (1596).

a way to deliver women without prejudice to them or their infants.

It is thought that the secret was first used by Peter the elder or Peter I, and then by his brother Peter II and his son Peter III, for in the attic where Peter III's instruments were found the box contained three sets, each showing some improvements. Each set contained a pair of obstetric forceps, a vectis and a fillet.

It was by the use of these forceps that the Chamberlens were such successful obstetricians and maintained their position at Court. Dr. Hugh Chamberlen, senior, was the

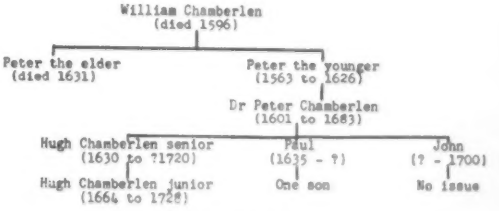

FIGURE VI.

The Chamberlen family tree. William Chamberlen came to Southampton from France as a Huguenot refugee in 1569.

accoucheur to the Queen of James II when the Old Pretender was born; he was not available and the baby was born before he arrived. It was because of this that the practice of having some Court official and later the Home Secretary in attendance at Royal births was instituted, as people stated that there had been a switch of babies. Hugh Chamberlen had other interests besides medicine; one was a national health scheme, another a land bank. In 1699, when the land bank failed, he retired to Holland under a cloud of suspicion of debt.

Dr. Hugh's son Hugh ends the male line of Chamberlens; he was born in 1664, was educated at Cambridge and was three times Censor of the College of the Faculty of Physic. Hugh, junior, was an orthodox obstetrician; he used the family secret, but allowed it to leak out in the last few years of his life before he died in 1728. He may have done this because of improved medical ethics or because he had

no son to pass it on to. In 1733 a book by Chapman made public the design of the forceps and their method of application.

When Dr. Hugh Chamberlen, senior, settled in Holland he became friendly with Van Roonhuyze, who was the leading obstetrician in the country. It has been stated that the secret was sold by Chamberlen, but what it was is not known. Van Roonhuyze and his colleagues had an obstetrical monopoly in Amsterdam and sold their secret to doctors who could afford to buy it. When the secret became public it was found to be a spatula-like object or vectis

Figure VII.
A midwife going to a labour. (Thomas Rowlandson, 1756 to 1827.)

and bore no resemblance to the Chamberlen forceps. It was often said that Chamberlen swindled Van Roonhuyze and gave him either a vectis or one blade of the forceps; but there is good reason to believe that Van Roonhuyze was the real culprit, and that although he had a pair of forceps he sold the vectis to his pupils. In any case, Palfyne, a Belgian barber surgeon, was able to reconstruct the forceps from whatever Van Roonhuyze displayed, and in 1721 described a pair of forceps. This was about the time when Chapman and Giffard described the forceps in England. It seems incredible that such a marvellous invention as the obstetric forceps could have remained a family secret for more than a century, but this is what happened.

The original Chamberlen forceps consisted of two wide flat blades curved to fit over the child's head; the blades were locked together by tape.

At the beginning of the third epoch an increasing number of people were demanding that midwives should take more than the bishop's licence before they could practise. Figure VI shows a typical "Sarah Gamp" on her way to a case. A midwife, Mrs. Jane Sharp, in 1671 had written the first English book for midwives, and in 1737 Mrs. Stone published "A Complete Practice of Midwifery".

In 1697, at Lanark, William Smellie was born. He studied medicine at Glasgow and returned to his native town of Lanark, where he practised as a general practitioner and did midwifery. He left Lanark in 1738 as he wished to study normal labour, for the midwives would not call him in to the normal confinements. By this time he was using a pair of French forceps. Smellie went first to London and then to Paris, where he stayed for a year. Then he returned to London, where he earned a living at first teaching students by means of a dummy comprising a female pelvis and a doll to represent the baby. His practice was in the East End, and his students often assisted him when he went to a case. His basic teaching was that of William Harvey. He impressed on his students the truth that it required much more skill to avoid than to perform obstetric operations. He set a pattern of practice with personal teaching that persists until this day. He wrote

Figure VIII: A man-midwife.

several text-books on midwifery. He modified the straight forceps in two ways: firstly, he added the pelvic curve, and secondly, he devised a simple method of locking the two blades and so completed an instrument which in essentials has needed no major modification since. He devised other instruments which are now no longer used. It was Smellie who first described the mechanism by which the baby's head moved through the maternal pelvis, and because of his knowledge of both the birth canal and the fœtal head, he was able to add the pelvic curve to the forceps and advocate the correct application of the forceps to the fœtal head. He disapproved of a high forceps application—for this type of patient he recommended internal version. He described a method of delivery of the aftercoming head in a buttock presentation, either by the hand or with forceps. He was the first to measure the pelvis and recognize pelvic contraction. In France, Levret occupied a similar position to that of Smellie in England—both were masters in the art of the use of forceps.

With the introduction of the forceps the midwives realized that their calling as an exclusive female art was threatened. Smellie was assailed by all the midwives; a prominent one, Mrs. Nihill, alluded to Smellie's large hand as "a delicate fist of a great horse, godmother of a he-midwife". She also referred to "the disciples of those self-constituted men-midwives made out of broken barbers, tailors, or even pork butchers, for I know myself of one of the last trade who after passing his life stuffing sausages is turned an intrepid physician and man-midwife" (Figure VIII). It is to Clément of France and to Smellie of England that the world is indebted for the male *accoucheur*. Smellie deserves the title of the master of British midwifery. No *accoucheur*, ancient or modern, unfolded so many of the principles of true obstetric science and put them into practice. The most successful of Smellie's pupils

was William Hunter. He became the obstetrician to George II's Queen and practised his midwifery in both the East End and the West End of London. His great contribution to obstetrics was anatomical. "The Anatomy of the Human Gravid Uterus" was published in 1774. It is the finest work of its kind ever published, because of the high standard of its illustrations. From his practice in obstetrics he was able to create his famous museum. His views on labour were those of Harvey and Smellie—namely, masterly inactivity (Figure IX). It is not known whether it was he or his brother John who discovered the placental circulation. William Hunter quarrelled with his more famous brother John, though both in their own spheres advanced their own subjects, obstetrics and surgery respectively, and helped to convert them from despised arts to accepted branches of medicine.

FIGURE IX.

A cartoon printed in London in 1804: "Time the best doctor."

Smellie was followed by a series of man-midwives—his son-in-law, Dr. John Harvie, Bartholomew Moore, first Master of the Rotunda, and Fielding Ould, second Master of the Rotunda and the first important Irish teacher of midwifery. These were followed by Thomas Denman. It was he who first described some aspects of congenital syphilis. He was the first licentiate in midwifery of the College of the Faculty of Physic, and he obtained the diploma in 1783, the year of William Hunter's death. He soon became a teacher of the male midwives and a true consultant in obstetrics. His works were prolific and lucid and his teaching was conservative. He pointed out that over-confidence in obstetrics was as dangerous as ignorance.

Towards the close of the third epoch, despite the developments in unorthodox practice, the man-midwives advanced steadily in their knowledge of the mechanics of labour, mechanical modes of delivery and mechanical means of estimating contraction of the pelvis. They founded the lying-in hospitals where poor women could have their babies, and confinements took place in bed rather than on the obstetric stool. As a result, fewer women died in labour and more children were born alive. This having of babies in hospital brought on the next problem—that of lying-in fever. Puerperal fever bid fair to lose more lives than had been saved by the better management of labour. Hippocrates had described the death from puerperal fever of Thasus, wife of Philinus. In the centuries that followed, thousands suffered from this disease and few recovered. In the late eighteenth and early nineteenth centuries the disease was such a menace that the lying-in hospitals would have been closed if some other place had been available for the poor to have their children. Charles White of Manchester, towards the end of the eighteenth century, adopted with some success the sound principles of fresh air, cleanliness and postural drainage for the prevention of the disease; he had no deaths in his own practice. He also advocated Cæsarean section in cases of severe disproportion.

In 1843 Oliver Wendell Holmes read his paper to the Boston Society of Medical Improvement on "The Contagiousness of Puerperal Fever". His paper proved conclusively by compelling logic that the disease was conveyed from patient to patient by the attendant. Holmes was savagely attacked—his paper was not even widely read until it was reprinted in 1855. Physicians would not believe that their hands were unclean. In this third epoch the discovery of the forceps gave a great impulse to the development of obstetric chairs in the universities and to lying-in hospitals. Doctors had a better knowledge of the pelvis and a clearer understanding of the anatomy and physiology of pregnancy and labour.

The Fourth Epoch, 1850 to 1950.

The fourth and last epoch began just a century ago. Semmelweis was born in 1818 in Budapest, and qualified in 1844. The Vienna Lying-in Hospital in 1840 had as the professor of obstetrics Johann Boer. He had introduced the methods of Charles White and reduced the incidence of puerperal fever considerably. When he was succeeded by Professor Klein it rose from 1% to 8%. It was this state of affairs, and the difference between the incidence of puerperal fever in the wards managed by the pupil midwives and those managed by the students (the incidence in the latter being four times as high as in the former) that led Semmelweis to study the problem of puerperal fever. The pupil midwives were not allowed in the dissecting room—the students were. After his friend the professor of forensic medicine had died from an illness very similar to puerperal fever, having cut his finger whilst dissecting a woman who had died from this condition, Semmelweis announced his doctrine—that puerperal fever was caused by the conveyance to pregnant women of putrid particles derived from living organisms through the agency of the examining fingers. He proved his point by making the students wash their hands in chloride of lime before attending a patient. The death rate in his wards dropped from 11·4% to 1·27%—a rate a little better than the midwives'.

So hostile was his chief, Professor Klein, that Semmelweis lost his position in the clinic at Vienna, and he returned to Budapest, where he was later appointed professor of midwifery. He carried on his prophylactic work there on the treatment of puerperal fever. His colleagues in Vienna remained hostile, but the doctrine had a better reception in Great Britain. Semmelweis died of blood poisoning in Vienna in 1865, following a cut he received whilst performing a gynæcological operation. He died from the very disease that he had spent his whole professional life preventing pregnant women from acquiring.

It remained for Louis Pasteur to complete the story of puerperal fever. In 1879 Pasteur showed that the organisms which were causing the disease were bacteria.

Oliver Wendell Holmes in 1893 was able to look back on his essay written fifty years previously, wherein he stated that puerperal fever was contagious. He lived long enough to know of Pasteur's discovery. Semmelweis did not.

The next great advance in this epoch was the discovery of anæsthesia. Michael Faraday, a student of Humphry Davy, in 1818 had noted that ether mixed with air when inhaled had the same effect as nitrous oxide. It is to Dr. Morton, of Boston, United States of America, that the essential credit for the use of ether as an anæsthetic agent should be given. In 1842 he used it as an anæsthetic agent. Its first known use in obstetrics was in 1847 by Dr. Long of Georgia, who gave it to his wife. The use of ether to relieve the pain of childbirth was resisted mainly by spinsters and women over the child-bearing age; it was said that the suffering which a woman undergoes in labour is one of the strongest elements in the love she bears towards her offspring. James Young Simpson was born in Edinburgh in 1811, the seventh son of a Bathgate baker. He graduated in 1829 at the age of eighteen years; ten years later he was appointed to the chair of midwifery in the University of Edinburgh. Chloroform had been described in 1831, and in 1847, just five years after Morton had used ether for a tooth extraction, Simpson used chloroform to anæsthetize a child who was having one of the

long bones of the forearm removed. Later he used it for his maternity cases. The argument for and against anæsthesia in childbirth continued until 1853, when Sir James Clark, Physician in Ordinary to Her Majesty Queen Victoria, wrote to James Simpson reporting that the Queen had been given chloroform as an analgesic for the delivery of Prince Leopold. This settled the argument. The discovery of the use of ether as an anæsthetic was clouded by many personal tragedies. Simpson was more fortunate; there was never any question as to who introduced chloroform to obstetrics. He died in 1870, and all Edinburgh mourned his passing.

Louis Pasteur, born in 1822 in France, graduated as a chemist in 1847. He won international fame for his work in crystallography and fermentation; his further studies in putrefaction showed that it was due to a microorganism. In 1879 he demonstrated that puerperal fever was due to an organism which we now know as the hæmolytic streptococcus. It was his work that inspired Joseph Lister, then Regius Professor of Surgery at Glasgow University, to formulate his views on antisepsis. Lister was born in London in 1827 in a Quaker household and received his medical education at University College Hospital. He later went to Edinburgh to become Syme's house surgeon. Syme encouraged him and sponsored him; he married Syme's daughter and subsequently accepted the chair in Glasgow. There he published his paper in 1867 on a new method of healing compound fractures, abscesses *et cetera*, with observations on the causation of suppuration. This paper excited wide interest and argument. James Young Simpson bitterly opposed it. Antisepsis made possible surgery that had never been attempted before. When the Listerian principles were applied in the Rotunda Hospital in 1884, the maternal death rate was the lowest in Great Britain. Asepsis was the logical development of antisepsis. Lawson Tait was the first great gynæcological surgeon to practise asepsis, but for the wrong reasons. He believed in cleanliness. He washed his hands in soap and water before operating and kept his instruments meticulously clean, but would not believe that organisms caused any disease. It was Halsted who helped to convert Lister's antisepsis into the aseptic ritual we know today. It was he, whilst at the Johns Hopkins Hospital, Baltimore, who had the first rubber gloves made for his own hands. In this epoch changes were also seen in the operation of Cæsarean section. In 1877 Porro had advocated the removal of the uterus when Cæsarean section was performed. This method, coupled with antiseptic principles, made the operation fairly safe for the first time. It was left to Sanger in 1882 to lay down sound principles for an operation which conserved the uterus after a high incision, used ligatures in the uterine wall and with antiseptic principles had a reasonably low mortality rate. The upper segment operation was used until 1912, when Latzko suggested that the incision should be low in the uterus. The lower segment operation is the one now used. The lowering of the maternal death rate for Cæsarean section to about 1% has brought a regrettable tendency to resort to operation for the relief of each complication of labour, and to use a surgical rather than an obstetrical approach to the problems. The high percentage of abnormal deliveries in hospital, the constant resort to interference, and the limited opportunities offered to students to observe normal labour, all combine to obscure the fact that Nature is the best obstetrician. Smellie's dictum still holds—unnecessary interference increases the maternal risks. However, the use of Cæsarean section instead of forceful delivery in cases in which normal or ordinary delivery is impossible and some mutilating operation on the live child is necessary, has been one of the great advances in this epoch. Not only is the maternal mortality reduced, but many babies' lives have been saved. Mutilating operations on the live child are now seldom performed.

Improvements in the art of obstetrics occurred during this epoch. Tarnier in 1867 added the axis traction rods to the obstetric forceps, so that the pull was along the line in which it was required to move the fœtal head. Braxton Hicks, one-time obstetric physician to Guy's Hospital, in 1860 described his combined internal and external version, a belated development of the method that Paré had revived some three hundred years previously. Pinard developed the method of abdominal palpation. Credé gave us a method of expulsion of the afterbirth and urged the use of silver nitrate as prophylaxis against gonococcal ophthalmia—the cause at that time of one-quarter of the blindness in the world. Ballantyne in 1900 advocated the principle of antenatal care; the ideal then aimed at was not merely a living mother and perhaps a living child, but a healthy mother and child. In 1895 X rays were discovered by Röntgen. This discovery had a marked influence on obstetrics. The discovery was the result of careful scientific research, and nowadays an X-ray service is an essential part in any maternity hospital. The position and the number of the babies can be determined. A later development has been the exact measurement of the bony pelvis. At the beginning of the twentieth century the stage was set for the solution of the three major problems of labour—namely, pain, hæmorrhage and sepsis. Firstly, pain had been controlled by the use of anæsthetics. Ether was used first, then chloroform, then ether again; the latest one to be tried is "Trilene". In 1932 Grantly Dick Read stated that much of the pain of normal labour was due to fear and to lack of knowledge of the simple physiology of childbirth. According to Read a full understanding of the birth process and the ability to relax can be obtained during pregnancy, so that fear of labour is abolished and most of the pain of childbirth as well—so much so that childbirth is pleasant and the joy of feeling the baby being born becomes the peak of a woman's feminine experience. Grantly Dick Read claims to have obtained remarkable results. This method works in normal labours when the patient is willing to bear some pain. Secondly, hæmorrhage has been controlled by blood transfusions. The first transfusion of human blood was carried out in 1824 on a woman suffering from hæmorrhage in childbirth. Early in the twentieth century the four blood groups were described, and in 1938 blood banks were established; they afford a ready supply of blood which is so necessary in obstetrical emergencies.

Sepsis, the last of the trio, was conquered in many stages, firstly by Charles White's teaching, then later Semmelweis solved the problem by clinical observations. Pasteur showed that the streptococci caused it, and Lister with his antiseptic technique controlled it. Further conquests were made by the use of sulphonamides in 1935 and later by the use of penicillin and other antibiotics.

Coupled with these advances in the care of the mother, so too have advances been made in the care of the newborn, both premature and mature infants.

It was in this epoch that the man-midwife surgeons became obstetricians and gynæcologists, and the midwives at last became registered by the State, a recognition that the Chamberlens had desired some hundreds of years previously.

The relations between the midwives and obstetricians improved. The midwives, having received part of their training from the obstetricians, still attended to normal labours but were well instructed in the diagnosis of the abnormal and in the desirability of calling medical aid in such cases. This has led to the happy relations that now exist between the midwives and the doctors, and has ended the feud that had existed since men began to be interested in obstetrics.

The Royal College of Obstetricians and Gynæcologists was founded in 1928, and though now "only of age" is recognized as being on a level with the sister colleges, those of surgeons and physicians.

In Melbourne the Women's Hospital (or the Lying-in Hospital as it was then called) was established in 1856, and it was there that the students were taught their obstetrics.

Dr. R. T. Tracy, the first lecturer in obstetric medicine and diseases of women and children in the University of Melbourne, was appointed in 1864, early in the fourth epoch. He was followed by a distinguished line of lecturers who were as shown in Table I.

XUM

The Council of the Victorian Branch of the British Medical Association in 1924, concerned over the teaching of obstetrics in the university, and over the standard of obstetrical practice in both metropolitan and country areas, had set up a committee of nine to inquire into the conditions of midwifery work in this State. Dr. Dunbar Hooper was chairman of the committee and Dr. Robert Fowler, convener. Only two members of the committee are still alive—namely, Dr. Milne Sutherland[1] and Dr. Robert Fowler. This committee made many recommendations, one of them being that a chair of obstetrics be established in

TABLE I.

Lecturers in the University of Melbourne.

Title.	Date.
Lecturer in Obstetric Medicine and Diseases of Women and Children:	
Richard Thomas Tracy	1864 to 1875
Laurence Joseph Martin	1876 to 1878
James Jamieson	1879 to 1887
Walter Balls-Headley	1888 to 1900
Lecturer in Obstetrics and Gynæcology:	
George Rothwell Wilson Adam	1901 to 1913
Felix Henry Meyer	1914 to 1918
George Horne	1919 to 1920
Independent Lecturer in Obstetrics and Gynæcology:	
Reginald Herbert Morrison	1921 to 1925
Arthur Mitchell Wilson	1926 to 1929
Professor of Obstetrics:	
Robert Marshall Allan	1930 to 1946
Acting Professor of Obstetrics:	
William Ivon Hayes	1947
James Walter Johnstone	1948 to 1949
Acting Professor of Obstetrics and Gynæcology:	
James Walter Johnstone	1950

the University of Melbourne. This committee, no doubt kept alert by its convener, saw results for their work, for in 1925 Dr. R. Marshall Allan was appointed Director of Obstetrical Research in the University of Melbourne. In 1928 Dr. Marshall Allan furnished a very comprehensive report on maternal mortality and morbidity in the State of Victoria, and finally in October, 1929, he was appointed to the Chair of Obstetrics in the University. This appointment has raised the standard of obstetrics practised by doctors in Victoria to a level not bettered in any country, and in conjunction with the honorary medical staff of the Women's Hospital has placed that hospital's medical care on a very high level. The fourth epoch in Victoria has seen a great improvement in the teaching of obstetrics and in the standard of obstetrical practice in Victoria. This is shown by the low maternal death rate in Victoria for 1950—namely, 0·77 deaths per 100 deliveries.

Conclusion.

The husband has played varying roles during his wife's labour. In olden times he supported and comforted his mate; later he was an onlooker in the birth room, and still later he was banished from it. Now that women are practising the so-called natural childbirth he may again be near his wife, and be a companion to her during this important time in her life, and able to share her joy immediately the baby is born.

Having now traced the evolution of the obstetric art and science through epochs, one may be allowed to look back and say that in the first epoch Soranus stood out as the first obstetrician and gynæcologist in history. In the second epoch Ambroise Paré was the master of the art of obstetrics, whilst, unknown to the rest of the world, Chamberlen had invented the obstetric forceps. In the third epoch the name that stands out is that of Smellie. He was the master of British midwifery. In the fourth epoch it is difficult to name any one person; in Victoria the foundation of the Chair of Obstetrics in the University of Melbourne was the most important event.

[1] Dr. Bertram Milne Sutherland died on October 28, 1951.

Dr. Leslie Hurley in his recent Halford Oration said that the Golden Age of medicine in his opinion belonged to the time of Hippocrates. If I were asked for my opinion, I should like to predict that the Golden Age of obstetrics will be the fifth epoch—the one to come. I am not like Ambroise-Paré, who was certain that no further discoveries could be anticipated; there are still many fields to be conquered and many problems to be solved. The fœtal wastage during and after childbirth has not been reduced to the same extent as the maternal death rate. A time will come when the hazards of childbirth for mother and baby will be very small, and then indeed shall we differ from the words in Genesis, and say that "woman bringeth forth her children in joy".

Acknowledgement.

Figures I, II, III and IV have been taken from Raynalde's "Byrth of Mankynde", London, 1540; Figures VII, VIII and IX are from Harvey Graham's "Eternal Eve", London, 1951.

CARCINOMA OF THE BRONCHUS: THE PROBLEM OF EARLY DIAGNOSIS.

By ALAN H. PENINGTON,

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ADVANCES in surgical techniques during the past twenty years have been such that excision of a carcinomatous lung no longer constitutes a major barrier to the effective treatment of carcinoma of the bronchus. The major problem of effective therapy arises from the fact that the diagnosis is too often reached only when the optimum time for surgical excision has passed, and this delay in arriving at a diagnosis does not appear to have been materially reduced despite increasing awareness of the common features of the disease in its advanced form. Willis has stated that "the natural duration of tumours is often impossible to assess". This statement is applicable with considerable force in such an organ as the lung, so that in the absence of full knowledge of the evolution of carcinoma in the bronchus and some concept as to the duration of these tumours, there will be little prospect of our bringing this disease to the surgeons at an earlier stage in its course. It is, therefore, necessary to approach the problem of carcinoma of the bronchus through a clinical and pathological study in an attempt to formulate a warrantable hypothesis concerning the evolution of such tumours and the symptoms which may be produced during their development. Some such hypothesis may be formed through a careful study of the clinical aspects and course of the disease, and by analogy with the evolution of carcinomata of mucous membranes which are readily accessible to visual observation.

Many authors have suggested that carcinoma of the bronchus is becoming commoner, and while the statistical evidence which has been produced to support this view may be subject to differing interpretations (Wilhelm), Steiner has concluded that "the incidence is so high that it constitutes a major public health problem requiring appropriate clinical, experimental, and statistical studies". Statistical studies have been numerous and have led to differing interpretations, and to some conclusions as to possible causes of the increase (Doll and Bradford Hill), but have thrown no new light either on the duration of the tumours or on the earlier clinical manifestations. Brock's review of the literature, in 1938, led him to the conclusion that the maximum expectation of life after a diagnosis of carcinoma of the lung was sixty months, that the minimum was one month, and that the average was 8·8 months. These figures would appear, in 1951, to be much shorter, probably as the result of more frequent ante-mortem diagnoses, and it is apparent that a study merely of the periods between diagnosis and death will give no indication of the duration of the tumours or of their rate of progression. That such studies are of little value was shown by Adams when he

drew attention to the fact that, of patients treated by pulmonary resection, those with the history of symptoms of longest duration often survived longest after operation. It would therefore appear that statistical studies alone, whilst of importance in indicating the frequency of the disease and perhaps leading to some hypotheses as to ætiological agencies, are unlikely to lead to an improvement in diagnosis.

Experimental studies in carcinogenesis cannot be directed against man, nor can observations made upon animals be transposed unmodified into our conceptions of human disease. Particularly in carcinoma of the bronchus, there is no prospect of any improvement in our diagnosis or of any more definite conclusions regarding the evolution of the condition arising out of experimental pathology. Histopathological studies of carcinomata of the bronchi have been made in many series of cases, and Neuhoff and Aufses, in common with other pathologists, have concluded that study of the gross pathology of these tumours in resected lungs gives no indication as to the duration of the tumour or of the survival rates of the patients from whom the tumours have been removed by operation.

It is therefore apparent that the only source of study which may lead to a more sound concept of the duration of these tumours, and of the way in which they may first declare their presence, is through clinical study. In any group of cases subject to review, certain striking and isolated clinical features may be emphasized. Overholt has on many occasions spoken of the "silent phase" of carcinoma of the bronchus, and the discovery of these tumours during X-ray surveys of communities amply demonstrates that a carcinoma of the bronchus may be present for a considerable time before producing manifest symptoms, or symptoms which, because they are subjective, bring the patient to the doctor. When absolute reliance must be placed on symptoms which are in the main subjective and are noticed by the patient before he consults a physician, the fallibility of human observation and the varying thresholds to discomfort which are present in any group of individuals mean that patients will consult their medical advisers at all stages in the evolution of their disease, and "presenting symptoms" may be, and often are, the symptoms of advanced disease.

Published papers relating to the clinical features of carcinoma of the lung are innumerable and describe the frequency of various symptoms as they are presented in groups of patients. However, because these papers must rely on the patients' own observations and are related specifically to certain diagnostic features, they give little indication as to the development of the lesion, and often give no indication of the age of the primary tumour. In order to obtain any suggestion as to the earliest clinical features of the developing tumour, objective medical observation over a period of many years prior to the establishment of the diagnosis is desirable. If this is obtainable, then the clinical characteristics of the patient over many years may suggest the order of the appearance of symptoms relative to the growth of the tumour, and if objective investigations have been carried out during these years, some indications may be found of the way in which these tumours first suggest their presence.

The present study is based on the medical histories in 200 cases of carcinoma of the bronchus in which the diagnosis has been proved either by biopsy or by post-mortem examination. Each case history covers a period of many years prior to eventual death from the carcinoma, and although the presence of the carcinoma was, in many cases, not recognized until a short time before death, the case histories cover periods of at least eight or more years before the tumour was recognized. From a study of these case histories it may be shown that these tumours are probably of long duration, that their growth is insidious, that so-called presenting symptoms are symptoms only of the complications of the tumours and therefore appear late in the history of the disease, and that an appreciation of the significance of earlier symptoms and clinical findings may assist in making a diagnosis at an earlier stage in the development of the tumours.

Material.

In Australia, the Repatriation Commission occupies the unique position, by law, of being required in instances of disease which arise in ex-members of the armed forces, of having to form an opinion as to the relationship between such disease and the rigours of war service. Before a medical opinion can be expressed on such a subject, all the medical evidence relative to a claimant must be obtained, and must cover the entire life of the claimant up to the time of appearance of the disease or the occurrence of the death which has led to the claim. In the cases of those members of the forces who die from carcinoma of the bronchus, therefore, the medical file will contain objective and subjective data covering the life of the subject from his early years until the recognition of the carcinoma, and provides a unique opportunity for study which may reveal the way in which these tumours develop until they produce the striking symptoms which lead to the eventual diagnosis. Two hundred such medical files relating to patients who have died from carcinoma of the lung between 1947 and 1951 have been studied, with particular reference to the clinical evidence of disease during the years prior to the diagnosis of the carcinoma, and to certain observations which might have suggested intrabronchial disease long before a carcinoma was recognized.

Because the group of cases cannot be regarded as a typical sample of cases of carcinoma of the lung arising in the community, no conclusions as to ætiological factors may be drawn. Selection in some degree was unavoidable because of the fact that all cases are those which arose in a previously selected male portion of the community, and further selection occurred because of certain administrative considerations inherent in the functioning of the Repatriation Commission's medical service. Apart from these considerations, the series comprises only proved cases of carcinoma of the bronchus, the files of which contain adequate clinical data covering a minimum period of some years prior to death. No attempt will be made to relate the tumours from an ætiological aspect to any pre-existing disease. Neither has an attempt been made to relate either the clinical history or the duration of life to the histological patterns of the tumours, and any unproved case, or case in which the clinical files were incomplete, has been excluded from the series.

Analysis.

Age.

In any discussion as to the age incidence of carcinoma, the only age which can be definitely determined is the age at the time of death. Age at the time of diagnosis will be subject to varying factors involved in the diagnosis, and gives no true indication as to the date of development of the neoplasm. Conversely, the age at death from carcinoma will be influenced to some degree by the site of any tumour, as a skin tumour, by virtue of its location and the fact that it may not impinge on any vital structure and may cause death only after a long period, whereas a tumour arising in a bronchus may cause death at an earlier stage in its development as the result of bronchial obstruction and of subsequent infection.

The age distribution in the present series is represented graphically in Figure I, in which the logarithmic graph is superimposed on a logarithmic graph of the age distribution for deaths from all types of carcinoma in Australia during the years 1947, 1948 and 1949. Willis has stated that "pulmonary carcinoma on the average affects rather younger people than most other kinds of carcinoma", and in his series of cases the mean age was fifty-five years. The age incidence in the present series, when compared with the age incidence of the deaths from all types of carcinoma in Australia in the same year, does not show any departure from that of carcinoma generally, apart from the fact that the peak for deaths is earlier. Study of these comparative graphs suggests that, whilst the age incidence of carcinoma of the lung is no different from that of carcinoma in all organs, death may occur at an earlier stage in the disease because of the anatomical site of the

new growth, and its consequent lethal effect may be apparently more rapid than, for example, that of carcinoma of the skin.

If this interpretation of the age incidence is correct, then the evolution of carcinoma of the bronchus, at least in the early stages of its development, must be regarded as similar to that of other carcinomata, and the observations of developing carcinoma in accessible mucous membranes should apply with equal force to carcinoma of the bronchus.

Habits.

Doll and Bradford Hill have produced statistical evidence which they regard as indicating an ætiological relationship between cigarette smoking and carcinoma of the bronchus. In 128 of the present series there was a history of heavy

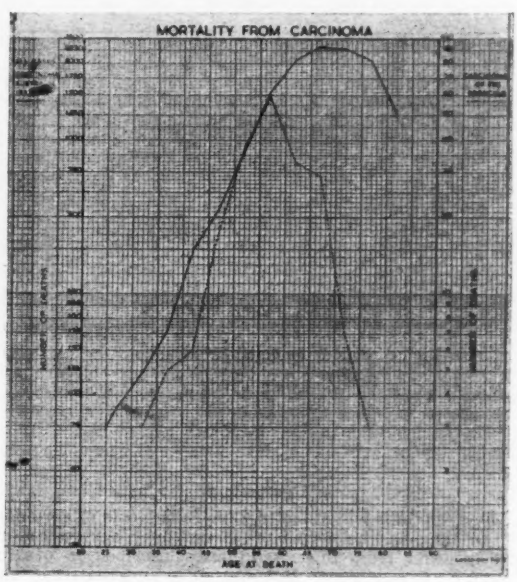

FIGURE I.

Mortality from carcinoma. Logarithmic graphs of the age at death in 200 cases of carcinoma of the bronchus, and the age at death in all cases of carcinoma in Australia during the same years (1947 to 1949).

cigarette smoking over many years; but no particular ætiological significance can be attached to this observation, as some addiction to tobacco smoking occurred at some time in the greater proportion of members of the armed forces. However, there is significance in the fact that few smokers do not develop some cough as the result of their habit, and that the symptom of cough is, therefore, common to the major proportion of the adult male population. As will be seen by the table of symptoms (Table II), cough was the only symptom present in every case under consideration, and its significance will be discussed later in this paper.

Previous Respiratory Infections.

Whilst it cannot be regarded as of ætiological significance, the presence of chronic or recurrent respiratory tract infections was common in the series. Chronic or recurrent bronchitis had been diagnosed in 135 cases (Table I), the diagnosis being based on a history of persistent cough with copious sputum, and either persistent or transient audible rhonchi in the chest. The symptom complex diagnosed as chronic or recurrent bronchitis had been present for many years in each case included in this group, and these symptoms often merged into those which finally gave rise to more detailed investigation which disclosed the presence of a carcinoma.

At some time during the early clinical history the presence of pulmonary tuberculosis had been confirmed by the demonstration of acid-fast bacilli in the sputum in 11 cases. While the active tuberculous infection had subsided in the majority of these cases, the resultant distortion of the bronchial architecture and persistent cough with sputum had remained, with symptoms indistinguishable from those described as being associated with chronic bronchitis.

In 37 of the cases there had been exposure to noxious war gases between 1914 and 1918, of such severity as to produce immediate respiratory symptoms and to require the subject's evacuation from the field as a casualty. There

TABLE I.

Associated Factors.	Number of Cases.	Percentage.
Recurrent bronchitis	135	67·5
Pulmonary tuberculosis	11	5·5
Chronic sinusitis	22	11·0
Noxious gases	37	18·5

is no evidence in this series that such exposure played any part as a carcinogenic agent, but all save four of the men so affected by gas had residual bronchial changes with associated cough and the production of sputum.

Symptoms Leading to Diagnosis of Carcinoma.

The symptoms which finally led to close investigation and a final diagnosis of carcinoma of the bronchus are shown in Table II.

TABLE II.

"Presenting Symptoms" of Carcinoma of the Bronchus.

Symptom.	Number of Cases.	Percentage.
Cough	200	100·0
Pain in chest	130	65·0
Hæmoptysis	79	39·5
Infection (pneumonia, lung abscess *et cetera*)	65	32·5
Pleural effusion	38	19·0
Neurological signs due to cerebral metastases	6	3·0

The "presenting symptoms" in the present series are similar to those which have been described in many papers on the clinical aspects of this disease. The three major groups of symptoms are cough, production of sputum and pain in the chest. All these symptoms are vague and of a general type, as there is no specific character which can be given to the cough, the nature of the sputum, or the location of the pain. These symptoms are also common to nearly every type of pulmonary disease, and if directly sought in any clinical history will in all probability be found to be present to some degree in all adult males. However, during the study of the clinical histories it was of striking significance that many of the patients described a recurrent or persistent "wheeze" in the chest, at times localized to one side, and associated with the cough and sputum. On four occasions this persistent wheeze gave rise to a diagnosis of "asthma" superimposed on pre-existing "bronchitis".

The pain in the chest described by most patients is rather indefinite in character and in location, and as most people will at some time notice transient chest pains, the importance of this symptom has, in my opinion, been overestimated. The bronchial walls are insensitive to pain, and the pain directly attributable to carcinoma of the bronchus

is felt only when there is encroachment on other structures, or when pleurisy supervenes.

For the purpose of this paper, hæmoptysis has been regarded as occurring when the sputum has been frankly blood-stained or blood-streaked on more than one occasion, or there has been a hæmorrhage of pure blood from the trachea. This symptom was present in 79 cases in the series. It is not a common symptom of carcinoma of the bronchus, and when it occurs it is the result of ulceration of the tumour, the erosion of blood vessels, or the accidental rupture of varices in the vicinity of the tumour. Hæmoptysis is not, therefore, a symptom of carcinoma of the bronchus, but is a complication, usually fortuitous, which may occur at any stage during the course of growth of the tumour, and it should not be regarded as an early symptom of the condition.

Pulmonary infection behind an obstruction in the bronchus occurred in 65 of the cases. Infection was suspected, either because of clinical evidence of acute toxæmia and the presence of pulmonary signs, or as the result of the radiological appearance when pulmonary disease was being investigated. The character of the infection when the patient was first examined was regarded as due to tuberculosis, pneumonia (often called virus pneumonia), or lung abscess of varying types, and further investigation alone disclosed the presence of bronchial obstruction with infection distal to the obstruction. The infection is not, therefore, a symptom of bronchial carcinoma, but is secondary to bronchial obstruction due to a tumour of sufficient size to occlude the bronchus. The obstruction due to the tumour itself may be incomplete; but with the added œdema of inflammatory changes, the bronchus may become occluded as the result of the œdema surrounding the tumour. Adequate treatment by antibiotics may effectively control the infection, with resultant resolution of the inflammatory œdema and reaeration of the broncho-pulmonary segment. Recurrence of localized segmental pneumonia after adequate treatment occurred in two cases in the series, and was only at a later date recognized as the evidence of a carcinoma in the involved bronchus.

Pleural effusion was present in 38 cases, and in each case was a late presenting sign, as it was seen only when the pleural surface was involved by the spread of a tumour to those surfaces.

In 18 cases a routine radiographic examination of the chest showed the presence of an opaque shadow, which was later proved to be the shadow of a bronchial carcinoma. The limitations of the definition of pulmonary tumours by radiography are very great, and an X-ray opaque mass in the lung parenchyma must reach an appreciable size before it will cast a shadow on the X-ray film. There have been repeated hopes that mass radiography will lead to the diagnosis of bronchial carcinoma at an early stage of development, and in some cases of the disease attention is by this means drawn to the presence of the tumour before the patient complains of symptoms. However, careful interrogation of those patients so discovered in this series evoked a history of cough and, usually, of the presence of minimal amounts of sputum or of pain in the chest for long periods prior to the discovery of the opaque area in the X-ray film.

Expectation of Life After Diagnosis.

In the present series the longest expectation of life after diagnosis of carcinoma of the lung was established by biopsy was twenty-seven months, and the minimum was four days. The interval between diagnosis and death over the series is graphically represented in Figure II, and as few patients were suitable for treatment by pulmonary resection, and as treatment by deep X-ray therapy or by nitrogen mustard was employed in only a few cases in the series, the form of treatment cannot be regarded as having influenced this time to any assessable degree. The figures are disturbing and most distressing, when it is appreciated that practitioners interested in pulmonary disease have been carrying out an intensive campaign in Australia to draw the attention of their medical colleagues to the importance of carcinoma of the bronchus as a disease entity, and to the urgency of reaching a diagnosis at an early stage in its development.

The series presented and the short expectation of life after diagnosis might be interpreted as an indication that carcinoma of the lung was a rapidly progressing disease. The only warrantable conclusion from the evidence presented is that when a diagnosis has been reached the tumour has already progressed to such a degree that it is producing gross changes, and that the diagnosis is made only late in its development. The rapidity of growth, or rate of evolution of the tumour, is not indicated by the short expectation of life, for it has already been indicated that the accepted symptomatology of carcinoma of the bronchus is, in fact, the symptomatology of the complications of an advanced bronchial carcinoma, and death is most commonly due to the complications associated with bronchial obstruction and infection.

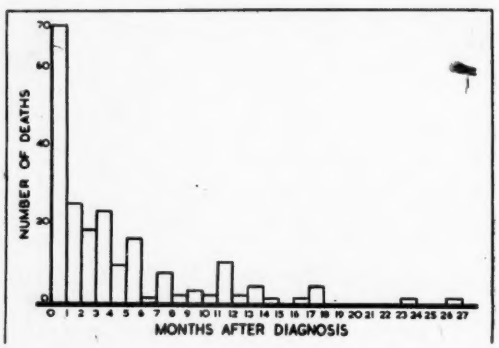

FIGURE II.

Expectation of life after diagnosis. Graphic representation of intervals between diagnosis and death in 200 cases of carcinoma of the bronchus.

DISCUSSION.

The symptoms which led to a final diagnosis of carcinoma of the lung in the series of cases under review did not greatly differ from those symptoms described in previous papers on this subject. However, it is apparent that when these symptoms were presented by the patient the disease had progressed to an advanced stage in its development. The symptoms which are so striking are not, in fact, the symptoms of carcinoma of the bronchus, but are the symptoms of the complications of carcinoma of the bronchus —namely, bronchial obstruction, hæmoptysis or metastasis. The symptoms which are due to the carcinoma may be indicated by a consideration of the evolution of tumours generally and by the application of these observations to the effect of the tumours on the physiology and mechanism of the bronchi.

The development of carcinoma in superficial mucous membranes of the body—for example, mouth, vulva, vagina and rectum—has been repeatedly observed. In many such cases the so-called precancerous condition of leucoplakia is seen and may be present for many years prior to the appearance of definite malignant changes. Where leucoplakia has not preceded the appearance of a carcinoma, the first manifestation of malignant disease is a localized thickening of the mucous membrane, which may be followed by a slowly progressive "heaping up" of cellular elements to produce a visible or palpable tumour, or may be followed by superficial ulceration. Such stages in the development of a bronchial carcinoma have not been described as they are rarely encountered, or if the tumour is accidentally seen at autopsy the appearance presented by the dissected specimen is not comparable to the appearance in a bronchus during life. However, from the knowledge of the development of carcinoma in mucous membranes generally, it must be concluded that similar stages in the development of carcinoma in bronchial mucous membranes must occur.

If, as is postulated, a change similar to leucoplakia may occur in bronchial mucous membranes, the change in the character of the mucosa will consist of metaplasia of the ciliated columnar epithelium—a condition often encountered in the bronchus—and some thickening of the mucosal membrane. Such a change in character would result in alterations of a minor degree in the bronchoscopic appearance of the mucosa, a change which has been frequently described as a "glazing" of the bronchial mucosa and is seen in cases of chronic bronchitis. If the important role of the cilia in the normal physiology of the bronchi is appreciated, it must inevitably follow that when the cilia are no longer effective, symptoms of cough and some sputum will frequently arise. The abnormal bronchial mucosa, therefore, leads to the appearance of symptoms which are described as those of "bronchitis", or when a respiratory infection has been previously established, the presence of bronchial metaplasia or "leucoplakia" will enhance the symptoms of such a respiratory infection so that "bronchitis" and "bronchial leucoplakia" may often coexist, even though bearing no direct ætiological relationship to one another. The high incidence of symptoms of "bronchitis" for many years in the group of cases under review suggests that bronchial metaplasia of some degree must have been present for a long period of time, and the gradual merging of the symptoms of "bronchitis" into the symptoms of advanced carcinoma of the bronchus is then readily understandable.

The proliferative phase of bronchial carcinoma will result in ulceration of the tumour, in encroachment on the bronchial lumen or in the occurrence of metastases. Ulceration of the tumour is not common, but when it does occur the symptom of hæmoptysis may be presented. In the present series of cases hæmoptysis was not a common symptom, and experience suggests that ulceration of the tumour is uncommon in the history of carcinoma of the bronchus.

Increase in size of the tumour with subsequent encroachment on the lumen of the bronchus is the commonest complication producing symptoms which draw attention to the disease. In the series, this was seen in the form of segmental or lobar atelectasis, or of infection behind an obstructed bronchus. Such complete obstruction will occur only when the tumour has reached a sufficient size to obstruct the bronchus completely. But before having reached such a size the tumour must, at a stage, lead to valvular trapping of air, with segmental expiratory emphysema. The frequent symptom of "wheeezing" may at times be attributed to such partial obstruction; but our present methods of radiological study of the thorax, with exposures taken in the phase of full inspiration, will never disclose such a form of emphysema. The absence of any descriptions of such segmental or lobar expiratory emphysema is not surprising, because it has rarely been sought, although it should logically be expected when the physiological movements of the bronchi during respiration are remembered.

When partial obstruction is present, this may become complete as the result of inflammatory œdema about the tumour. As has already been pointed out, modern antibiotic treatment of pulmonary infections may lead to subsidence of this œdema and to apparently complete resolution of segmental infection whilst a tumour still remains. Therefore apparently complete resolution of "pneumonia" in a male in the carcinoma age group does not exclude the presence of a carcinoma of the bronchus.

Diagnosis of carcinoma of the lung at an earlier stage in its development requires an appreciation of the minimal signs and symptoms resulting from alterations in the physiological functioning of the mucosa and of the bronchial walls. A dry cough or increased susceptibility to "bronchitis" occurring in a male in the carcinoma age group, even in the absence of radiological evidence of pulmonary disease, may be evidence of carcinoma in the bronchus. If this symptom is associated with a "wheeze", or with evidence of expiratory emphysema in radiographic studies of the lungs in both inspiration and expiration, then there is even a greater likelihood that carcinoma of the bronchus is the cause of the symptoms. In such circumstances, bronchoscopic examination should be considered an essential phase of the clinical study of the patient, and if no abnormality is detected should be repeated after an interval of only a few weeks.

Conclusions.

There is no real evidence to indicate that carcinoma of the lung is any more rapid in its development than is carcinoma in other mucous membranes. However, the accepted and described symptoms of carcinoma of the bronchus are symptoms of the complications of such tumours, and from the time of their appearance the expectation of life is short. Earlier diagnosis of the condition requires an appreciation of the fact that the symptoms of carcinoma of the bronchus are those of an abnormal bronchial mucosa—namely, cough, susceptibility to "bronchitis" and expiratory emphysema—and that these symptoms and signs require full investigation.

Bronchoscopy has not, in the past, occupied the position in chest investigation which it merits, for as Jackson states, "the bronchoscope bears the same relation to intrathoracic disease as the vaginal speculum does to pelvic disease", and when pelvic disease is suspected the failure to carry out a visual examination would constitute neglect. Such examinations in the hands of experienced bronchoscopists are not distressing to the patient and should be repeated if there is any warrant for such repetition.

The use of comparative inspiratory and expiratory films during the routine radiological investigation of pulmonary disease in males in the carcinoma age group may demonstrate areas of segmental expiratory emphysema due to the presence of a carcinoma in the bronchus.

Only by the appreciation of the common incidence of the condition, its insidious onset and vague symptoms, combined with meticulous and often frequently repeated examinations, clinical, radiological and bronchoscopic, is there any possibility of presenting patients with carcinoma of the bronchus to the surgeon at such a stage as to offer prospects of satisfactory surgical control.

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LEPROSY AMONG FULL-BLOODED ABORIGINES OF THE NORTHERN TERRITORY.

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Historical Survey.

IT is a common belief among the staffs of the coastal missions of the Northern Territory that leprosy was introduced by Macassars who visited the coast every year for many years to fish for trepang. C. E. Cook, however, found no evidence to support this belief and has shown that leprosy did not exist among the aborigines before the coming of the Chinese coolies in 1874. From that year Chinese were brought into the territory without medical examination, and by 1888 there were nearly 7000 in the Pine Creek-Burrundie area employed in railway construction. There were a number of cases of leprosy among the Chinese, who were almost all males with no inhibitions about cohabiting with native women. Inevitably leprosy was introduced to local natives, and several cases were recorded between 1890 and 1900. The disease remained confined to the Pine Creek-Alligator River area till as late as 1912. This was a natural result of the strict intertribal barriers which existed, each tribe being self-contained, remaining within its own hunting grounds and allowing of no intercourse with neighbouring tribes. The breaking down of these barriers, first by the establishment of the Goulburn Island and Oenpelli Missions near the original endemic area, and later by that of other missions, townships and cattle stations, resulted in the gradual spread of leprosy. During the war, leprosy control broke down, particularly at the imminent threat of invasion, when the leprosarium was closed and patients returned to their own districts to cause further spread of the disease. The last decade has seen a considerable increase in the number of aborigines affected with leprosy, so that the problem of control has become one of major proportions.

Present Distribution.

At the present time leprosy is endemic throughout the whole of the northern tropical portion of the territory. The humid tropical area lies to the north of the nineteenth parallel of latitude. The endemic area is sharply limited to this region. At the present time no known cases of leprosy exist south of this line. The dry southern area has remained free of the complaint despite ample opportunity for spread. The disease is now well known at every mission and native affairs settlement in the endemic area, and cases have been detected at almost every cattle station.

North of the nineteenth parallel there are approximately 7140 full-blooded aborigines. Table I indicates the distribution of these natives and the numbers of infected persons at, or originating from, these localities. Surveys have been carried out fairly extensively over the past nine months, and the figures quoted of natives examined are confined to examinations carried out during those nine months. Of the 7140 natives, 4181 or 58·5% have been examined. It is anticipated that most of the remainder will be examined within the next twelve months. The difficulty of collecting together small groups of nomadic natives in remote areas is great. However, the most heavily infected areas have been covered. The number of cases so far found is 264, an incidence of 37 per 1000 of the total native population in the endemic area. When surveys are completed it is estimated that the total number of cases will be not less than 400, or an incidence of 56 per 1000. This incidence figure is a very high one. In 1925 the incidence at Nauru Island was 300 per 1000, which is the highest figure recorded. Countries with an incidence of over 10 per 1000 are few and are mainly confined to Africa, despite the large numbers of infected persons in India, China and Central and South America. Some of the higher incidences per 1000 are as follows: Uganda 33·5, Tanganyika 26·5, Nigeria and Belgian Congo each 20, French Guiana 14·7, Fiji 13·9, and French Oceania 30·1. In the endemic area of the Northern Territory there are approximately 8000 Europeans, Asiatics and part-aborigines, among whom there are 30 affected with leprosy. The incidence among the total population of the endemic area is therefore 19·4 per 1000. Table II lists the admissions to the leprosarium since 1943. Until the end of 1949 all patients were admitted as soon as they were discovered. Since then increased surveys have produced so many cases that it has been impossible to admit all the subjects to the leprosarium, and the present practice is to admit only those subjects considered to be infective.

TABLE II.
The Leprosarium.

Year.	Number Admitted.	Number Discharged.	Deaths.	Number Remaining in Isolation.
1943 ..	8	Nil	2	62
1944 ..	6	Nil	2	66
1945 ..	8	1	Nil	73
1946 ..	13	1	4	81
1947 ..	19	2	8	91
1948 ..	6	7	7	83
1949 ..	20[1]	23	7	82
1950 ..	57[2]	2	Nil	137
1951 ..	41[1]	4	5	173

[1] Includes two readmitted.
[2] Includes four readmitted.

Spread of the Disease.

It has been shown that leprosy is spread by close contact, and that most persons who contract the disease become infected within their own household. Crowded living conditions and poor hygiene are big factors. There are comparatively small numbers of aborigines and large areas in which to live. Most of them are now living at missions, native settlements or cattle stations, crowded together in tiny "humpies" devoid of windows or ventilation of any kind. The natives' hygiene is poor, for many are unwashed, with little idea of the use of sanitary conveniences and fewer ideas on refuse disposal. These crowded, insanitary living conditions, together with a fairly high proportion of the infectious lepromatous type of case, form a set of circumstances ideal for the spread of leprosy. A subsidiary factor may be the presence of hookworm disease. Almost all missions and settlements are heavily infected. It is not uncommon to receive patients at the leprosarium with hæmoglobin estimations of 60% to 70% or lower and hookworm ova in the fæces. The long-standing subnormal health induced by hookworm infection may well be a predisposing factor to such conditions as leprosy. Opinions on the existence of hereditary immunity to leprosy differ, so that whether the fact that the disease has existed among Northern Territory natives for only sixty years renders them more liable to infection is a moot point.

Control.

The control of the spread of the disease is bound up, firstly, in the efforts now being made to improve the natives' standard of housing and in education in simple hygiene. In the second place, surveys are necessary for the early detection of affected people, so that they may be kept under observation, treated or isolated as thought necessary. During the past two or three years, as more staff has become available, surveys have been increased. At first they were carried out as opportunity arose, but now they are carried out regularly. A full-time medical officer is occupied in examining all persons on missions, settlements and cattle stations. Other medical officers carry out isolated surveys, and a regular monthly flying visit is made to all missions and to a number of cattle stations and settlements in the Victoria River district. Medical officers must have received some instruction in leprosy at the leprosarium before being permitted to visit settlements. Mission staffs, particularly nursing sisters, are to receive instruction in tropical diseases either at the

TABLE I.

Locality.	Resident.	Visitors.	Total.	Number Examined.	Number of Cases.	Incidence per Thousand.
Port Keats Mission	320	—	320	304	47	147·0
Bathurst Island Mission	500	110	610	605	56	92·0
Goulburn Island Mission	140	60	200	82	6	30·0
Millingimbi Mission	250	150	400	180	3	7·0
Elcho Island Mission	200	150	350	143	1	3·0
Yirkalla Mission	200	100	300	107	8	27·0
Oenpelli Mission	160	70	230	139	17	74·0
Roper River Mission	175	100	275	198	25	91·0
Groote Eylandt Mission	200	50	250	245	3	12·0
Groote Eylandt, Gray's Settlement	194	40	230	184	Nil	Nil
Native Affairs Settlements:						
Delissaville	150	—	150	100	5	33·0
Snake Bay	200	—	200	124	12	60·0
Tandangal	300	—	300	201	3	10·0
Catfish	40	—	40	10	Nil	Nil
Native Reserves	545	—	545	45	7	13·0
Other Districts:						
Timber Creek and Wave Hill	1200	—	1200	580	18	15·0
Daly River	250	—	250	27	2	8·0
Boroloola	350	—	350	346	10	29·0
Roper Valley	250	—	250	117	1	4·0
Adelaide and Alligator Rivers	100	—	100	25	2	20·0
Darwin and Centres along Overland Road	600	—	600	419	38	63·0
Totals	—	—	7140	4181	264	37·0

School of Tropical Medicine or in Darwin. A comprehensive medical card system has been instituted, and every native examined has his medical history noted. The notes are complete, recording all illnesses and examinations. A medical officer visiting a settlement carries the appropriate cards with him and is able to check, among other things, leprosy contacts, suspects and discharged patients. The third step in control is the isolation of infective cases at the leprosarium. The Leprosy Ordinance of 1928 gives the Chief Medical Officer authority to enforce the isolation of any person suffering from leprosy. While the isolation of infective persons is insisted upon, persuasion is always preferred to compulsion.

It has been the universal experience in endemic countries that compulsion has the undesirable effect of driving many infected persons into hiding. But until native hygiene and living conditions can be improved, there appears to be no alternative despite obvious objections to compulsory removal of the patient from his family and tribe.

Criteria for Isolation.

It has become a general rule throughout endemic countries that isolation is necessary only for those patients in smears from whose skin or mucous membrane Hansen's bacillus can be isolated. It is evident, however, that this rule must be varied from country to country and from race to race according to circumstances. Much evidence has been produced to show that leprosy is of low infectivity, that children are more susceptible than adults, that infection occurs largely by household contact with "open" cases, and that most patients with the tuberculoid type are only slightly infectious. Hence in most countries European patients with negative smear findings who will cooperate in remaining under observation and treatment, and who will cooperate in maintaining certain precautions which include sleeping in a separate room, avoiding close contact with children and using separate eating utensils, are no longer confined to an institution. But whereas the European represents an extreme group to whom the maximum of freedom may be given, the primitive aboriginal represents the other extreme. His standard of hygiene is poor, he will not sleep apart, nor can he restrain his intense fondness for children. He does not understand the word "infectious". Hence the infectivity of a patient under European conditions may be negligible; but a patient with the same condition living under aborigines' conditions would constitute a definite risk. Furthermore, many of the aborigines live in distant, inaccessible areas, and this fact, together with their nomadic habits, makes it difficult to keep them under observation. A clawed hand or a mutilated foot is a serious drawback to the native who has to stalk and spear animals for food, and he is especially liable to trophic ulcers of his bare, anæsthetic feet. A decline in his prowess as a hunter results in a decline in his nutrition, and the disease then has a tendency to advance into an active infectious state. No doubt these factors influenced the National Health and Medical Research Council when in November, 1950, it drew up a "Standard Procedure in Respect of the Control of Leprosy". The Council considers that all full-blooded natives who fall into one of four categories should be isolated. The categories are as follows: (i) all those with active leprosy, whether bacteriological examination gives positive results or not; (ii) all those with clinically suggestive conditions, whether bacteriological examination gives positive results or not; (iii) those patients liable to relapse who cannot be kept under satisfactory supervision outside an institution; (iv) crippled or other subjects who cannot, outside an institution, maintain a comfortable standard of living or be calculated to maintain an adequate resistance to the advance of the disease. In the Northern Territory it is the practice to admit the following patients to the leprosarium: (i) all those with lepromatous lesions whether smear findings are positive or not, excepting those patients in whom the disease has been "burnt out" for several years; (ii) all patients with tuberculoid lesions who show active signs of disease—that is, those with clinically active or recurring leprides or neural reactions—irrespective of whether smear findings are positive or not; (iii) patients with clawed hands or mutilated or ulcerated feet of such degree that they are materially handicapped in their primitive mode of life. Children with early indeterminate lesions (described below) are not now admitted to the leprosarium, in view of the fact that in a proportion of them the disease can be expected to abort. Constant contact in a leprosarium with infective patients can only result in a lessening of the chance that the disease may subside. It is extremely doubtful whether such children are infective.

Clinical Types.

In 1948 the Fifth International Leprosy Congress recommended a classification of the disease which is now generally accepted. Two polar groups, lepromatous and tuberculoid, form the basis of the classification with an intermediate group named indeterminate. The diagram (Figure I) shows how the first lesion is an early indeterminate one, which consists of small flat depigmented areas. Later, according to whether the patient resists the disease or not, the lesions assume the characteristics of one or other of the polar groups. Characteristically the lesions of the infectious lepromatous type are spreading skin infiltrations, swarming with bacilli. Lepromatous patients

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have little or no resistance to the disease. The tuberculoid or resistant type has circumscribed depigmented lesions which are anæsthetic and anhidrotic and with a strong tendency to self-limitation. Bacilli are scanty in such lesions. The proportion of these groups varies from race to race and even in the same race in different countries. The characteristics of the different groups also vary in different races.

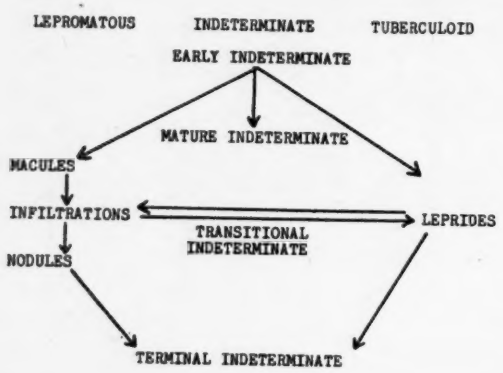

Figure I.

In all endemic countries the early indeterminate lesions are common, and the Northern Territory provides no exception. These lesions usually occur in children, and in a varying proportion of cases the disease aborts at this stage. Ryrie found that in 75% of Chinese children in Malaya the lesions disappeared and the patient remained well. Cochrane found that in India the figure was 53·2%. We are unable at present to estimate the number of aboriginal children with early lesions who overcome the infection. However, we have had a number of patients under observation for eighteen months, in whom the lesions have disappeared and in whom no further signs have occurred. Ryrie records that among African Negroes these lesions are *café au lait* in colour. Among aborigines the partial depigmentation and hyperæmia of the lesions produce a bright coppery colour, which gradually loses its intensity as the lesion ages. The same colour is characteristic of the lepride in the aboriginal. C. E. Cook, who was actively associated with leprosy control in the Northern Territory up to 1939, told me that he had not infrequently observed early signs of leprosy in adult natives. During the past three years I have never seen early leprosy in a native aged over eighteen years, though such signs are common before that age. It appears that leprosy is now so widespread that all young native children in recent years have come into contact with "open" cases. Children being far more susceptible than adults, it follows that any native who has reached adult life without contracting leprosy is unlikely to do so.

The usual proportion of lepromatous cases is about 30%, but among Northern Territory aborigines the percentage reaches the fairly high figure of 49·3. Among the aborigines the usual stages of maculation, infiltration and nodulation are seen. However, infiltrations are almost entirely generalized, few localized patches of infiltration being seen. Gross nodulation is rare. Lepra reaction is very common and often severe, a large proportion of the patients with the moderately severe and advanced lepromatous lesions being constantly on the threshold of reaction. Any small disturbance in health, or even a change in weather, is likely to tip the scale and produce a severe reaction. Reactions of the *erythema nodosum* type, said to be a favourable sign (Cochrane), occur frequently. Unfortunately the more severe true lepra reaction also occurs frequently, with large subcutaneous nodules, high fever, and occasionally spleen and liver enlargement and albuminuria. The usual deterioration in the patient's condition ensues. Eye lesions with their unfortunate sequelæ are common.

Tuberculoid lesions among the aborigines are coppery lesions with a narrow raised edge. The lepride with the broad edge is uncommon. The evenly raised major lepride is very uncommon. The diagnostic problem of differentiation between this lesion and localized lepromatous areas therefore seldom arises. The favourable tuberculoid reaction is rare. We observed only one case in three years among full-bloods. The acute ulcerating lazarine leprosy of Central and South America apparently does not occur among Australian natives.

Mature indeterminate lesions, said to be common in certain parts of Africa, occur only as 2% of cases among aborigines. Most cases can be placed definitely into one or other polar group. Indeterminate cases due to swing from one polar group to the other are rare, as they are in other races, only one case being observed in recent years. Burnt-out cases of both polar groups tend to become less definite in nature and may become indeterminate. Such cases are found occasionally among aborigines.

Neural reactions are common in all three types and affect mainly the ulnar nerve, causing considerable enlargement and pain and ultimately increasing the clawing of the hand.

The proportion of males to females among adult cases is the usual one of about 2:1. Among children with early indeterminate lesions the sexes are affected equally. At Bathurst Island the sex incidence is almost reversed. Among 56 patients, 35 are females and 21 are males. It has been the practice at the mission to segregate the girls in a dormitory from three years of age until the marriage age of sixteen or seventeen years. The inclusion of a number of lepromatous subjects in a dormitory of children at the most susceptible age no doubt accounts for the increased number of cases amongst females. A close watch on the dormitory inmates should produce a sharp drop in the incidence among females.

The Leprosarium.

Isolation is carried out at Channel Island leprosarium. The island lies seven miles from Darwin, within the extensive Darwin Harbour. The modern outlook on leprosy, or Hansen's disease, views with disfavour the complete isolation of infected persons, especially on islands. Apart from this, Channel Island suffers from some drawbacks, mainly in a lack of a permanent water supply and a lack of arable land, and it has supply difficulties owing to the 25-foot tidal rise and fall. A new site has been chosen on the mainland, 14 miles by road from Darwin. Plans are complete, and work will start shortly on what it is hoped will become an ideal native settlement, emphasis being placed on teaching the natives to improve their living habits, and rehabilitation in useful employment.

In the meantime every endeavour is made to make patients feel that Channel Island is not an island prison. Any patient could abscond by simply walking to the mainland at low tide. Visits from relatives and friends are encouraged. Patients own their own canoes, dinghies and launches, and spend much of their time sailing in the harbour, or fishing and hunting. Three times a year patients are given a week's "holiday". They separate into tribal groups and go camping on the neighbouring mainland on the southern uninhabited side of the harbour. Most of the holiday-makers prefer "bush tucker" for the week, but supplies are delivered to them by launch so that the crippled suffer from no lack of nourishment. It is found that these holidays benefit patients considerably, as they allow the aboriginal an opportunity to give vent to his nomadic instincts and to hunt to his heart's content the game that abounds in this area. Week-end or day excursions of this nature are also permitted. The simple wants of the aboriginal, are catered for as fully as possible. The knowledge that Channel Islanders receive a very liberal tobacco allowance, money for any work they do, good food, a good clothing allowance, and frequent picture shows has earned for them the title of "rich men" among their compatriots, and has been a big factor in breaking down the natural objection of new patients to being transferred from their own "country" to the leprosarium. Over the past twelve months several aborigines have come forward and

requested treatment at Channel Island—a big thing from these primitive people. Absconders are few, morale is high, and visitors are impressed with the happy appearance of the patients.

Treatment.

After their admission to the leprosarium, it has been found that most natives, especially those from the "bush" or those who have been in hiding, improve in general health. There can be no doubt that this general improvement also has a beneficial effect in relation to the specific condition, and it is a factor which must be borne in mind when the effect of any particular drug is being assessed. This being borne in mind, it has still been noticeable that the improvement of patients has been more rapid since the introduction of "Sulphetrone" in November, 1948. The drug was administered by mouth with a maintenance daily dose of three grammes. The only toxic effect noted was occasional sudden severe anæmia, which responded rapidly to treatment with iron, yeast and liver extracts. In November, 1950, in view of favourable reports in journals and after personal communication with overseas workers, more particularly with J. Lowe of Nigeria, treatment with the parent sulphone diaminodiphenylsulphone (sulphone-DDS) was instituted. Our standard dosage has been 150 milligrammes per day for patients weighing under ten stone and 200 milligrammes per day for patients over that weight. We have experienced no toxic effects, and results so far have been very satisfactory. The cost of treatment was reduced from £13 per year per patient with "Sulphetrone" to £1 per year per patient with sulphone. In November, 1950, we also commenced a trial of thiosemicarbazone in 24 cases. It is hoped to publish this series later. Our results have not been nearly so favourable as those published by Ryrie. A trial of ACTH is at present being undertaken in lepra reaction, with what appear to be very favourable results.

Discharge of Patients.

Modern therapy has increased the chances of early discharge from isolation; but the circumstances previously outlined of native conditions render caution necessary in considering an aboriginal for discharge. Our general rule is that no patient is considered for discharge unless the following conditions are fulfilled: (i) he has shown uninterrupted progress for twelve months; (ii) consistently negative monthly smear findings have been obtained for the next twelve months; (iii) the patient is in good physical condition; (iv) he will be accessible for reexamination; (v) he is proceeding to a locality where he can be properly looked after if he becomes ill, preferably at a mission or settlement with a trained nurse in attendance. Table II shows that in the past nine years 40 patients have been discharged from the leprosarium, of whom eight have been readmitted. With the expanding range of medical visits to outback areas, it is expected that it will be possible to discharge more patients in the near future. This is a good thing for the patient and also a good thing for the ultimate control of leprosy, for it has been found that a discharged patient acts as favourable propaganda in his home district. Natives are beginning to realize that there is now "good medicine" for leprosy.

Acknowledgements.

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CHRONIC AREGENERATIVE ANÆMIA OF THE NEWBORN.

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CHRONIC aregenerative anæmia, chronic hypoplastic anæmia and congenital hypoplastic anæmia are terms applied to an anæmia of the neonatal period that has certain distinctive features that separate it sharply from other anæmic states of the newborn infant. In contrast to such conditions as *icterus gravis neonatorum* and nutritional anæmia of infancy, chronic aregenerative anæmia is excessively rare. It owes its separation as a definite entity to the great interest that has developed during the last two decades in examination of the bone marrow during life. The purpose of this communication is to draw attention to the condition, to describe the main clinical and hæmatological features that have been noted in the few published descriptions, and to describe a case that has been studied in the hæmatology clinic of the Royal Hobart Hospital.

General Clinical Features.

The signs that are absent constitute the most noteworthy feature of the clinical picture, and this curious fact gives the illness an overall picture that is in a way diagnostic. The predominant feature is the pallor of the infant, and by the time the child is brought for examination this has usually advanced to the deathly whiteness of severe anæmia. The onset is insidious and the parents have usually noted irritability, restlessness and anorexia concurrently with the development of the steadily increasing pallor. The age of two or three months is usually attained before the appearance is sufficiently alarming for the parents to seek medical advice, though they may have suspected from birth that all is not well with the child. It is usual for the child to appear perfectly well for the first month of life.

As the anæmia becomes severe, tachycardia, enlargement of the heart and functional systolic murmurs make their appearance, and with these features the clinical picture is in the main completed. Vomiting is not as a rule a notable feature, the bowels usually function normally, and there are no urinary symptoms or signs.

The following negative features are of special note:

1. There is no enlargement of the liver or spleen as a rule.

2. There is no deformity, either general in the way of stunting of growth or local as in the stigmata associated with congenital syphilis; apart from the pallor and symptoms attributable to severe anæmia the subject is a perfectly normal infant.

3. There are no hæmorrhagic manifestations in the form of ecchymoses into the skin, purpuric spots or hæmorrhages from mucous membranes such as those of the nose or bowel.

The importance of these negative features lies in the clinical differentiation from leuchæmia, hæmolytic anæmias, syphilis and anæmia secondary to malignant disease. For practical purposes the clinical picture may be summed up as progressive and marked pallor in a child a few months old with no other detectable abnormality on clinical examination apart from those attributable to anæmia itself.

Hæmatological Aspects.

The peripheral blood in these cases exhibits an unusual phenomenon in the realm of hæmatology—"something of a curiosity" in the words of Whitby and Britton (1950)—

and that is a pure red cell anæmia. In cases of aplastic anæmia, as is well known, a severe anæmia is accompanied by leucopenia and hypoplasia of the myeloid cells in the marrow and by thrombocytopenia; in chronic aregenerative anæmia of the newborn, on the other hand, the diminished red cell count is associated with a normal or only slightly lowered leucocyte count and with a normal platelet count. The red cells may be only moderately reduced, but more usually there is severe anæmia when the disease is first diagnosed, and the red cells not uncommonly number less than one million per cubic millimetre. The hæmoglobin value corresponds with the red cell count, and the anæmia is normocytic and normochromic. The reticulocyte count is low, and nucleated red cells are not seen in the peripheral blood, in contrast to other infantile anæmias. Anisocytosis, poikilocytosis and polychromasia are not usually pronounced features. The differential white cell count is usually normal, or there may be a mild neutrophile leucopenia of insignificant degree.

The bone marrow is very characteristic and most striking. The cellularity is usually within normal limits, or it may be very slightly greater or less than normal. The outstanding feature is the virtual absence of cells of the erythroblastic series. At times this absence appears to be complete in the small sample obtained by aspiration or by trephining, at other times a few normoblasts or proerythroblasts can be found only after a slide preparation has been searched from end to end. Alongside this absence of erythroblastic activity there is normal leucopoiesis, megakaryocytes are present in normal numbers and appear cytologically normal, and there is present a normal number of monocytes, lymphocytes and plasma cells. Reticulum cells are not infrequently present in increased numbers, up to 20% of the total nucleated cells according to Israëls (1948), and an observation that has sometimes been made has been an increase in eosinophile myelocytes.

The general picture therefore is that of a pure red cell anæmia without any evidence of impaired development of the formed elements of the blood other than the erythrocytes. Whitby and Britton (1950), in their discussion on aplastic anæmias, state that they have been able to find only seven examples of pure red cell anæmia described in the literature.

Other hæmatological features of interest are mainly of a negative kind. There is no evidence of increased saline fragility of the red cells, the serum bilirubin content is not increased, and there is no increase in fæcal or urinary urobilinogen content. A hæmolytic factor is further excluded by the failure to demonstrate circulating hæmolysins. Coagulation time, bleeding time and clot retraction are normal. The Wassermann reaction is absent, and no significant abnormality has been demonstrated in the blood biochemistry.

Prognosis.

The ultimate prognosis in cases of chronic aregenerative anæmia of the newborn is a matter of uncertainty at the present time. In most cases the child appears to require repeated transfusions for the maintenance of life and health, and so long as these are given at regular intervals the infant may grow to be a healthy child in every way, indistinguishable from his fellows, and possibly may reach puberty and beyond. In some cases also the condition appears to undergo remission, and such remission may be permanent. Intercurrent infection is an ever-present danger to life if the red cell count is allowed to fall too low between transfusions.

The difficulties in estimating the prognosis will be resolved as the years go by. The syndrome is only a recently separated entity, and the final answer to the question of the ultimate outlook for such patients as the child described below will be given only after they have been followed and studied over the years. At present it can be said that the disease is a chronic one, that with efficient management a normal infancy and childhood may be hoped for, that there is a definite possibility of remission, and that there is on the other hand a grave possibility of death from intercurrent disease. Whether the condition passes into a true aplastic anæmia, and whether a normal adult life can be attained and maintained are questions for the future which nobody can answer with certainty at the present day.

Treatment.

As already noted, the only treatment available for these patients is repeated transfusions. These have to be repeated as a rule every two to three months, and a useful guide for practical purposes is to transfuse the patient when the red cell count falls to the region of 1,500,000 per cubic millimetre. The importance of conserving the veins as far as possible is obvious enough, and tibial marrow infusion is probably the best method during infancy, though this procedure has a rather bad reputation for the giving of blood. Diamond (1946) suggests frequent transfusions of small amounts of blood (100 to 200 millilitres) in preference to large transfusions at longer intervals for two reasons: firstly, to maintain the red cells and hæmoglobin content more constantly at a satisfactory functional level, and secondly, to lessen the danger of the development of pigment deposit in the liver, skin and other organs, which tends to occur in patients who have to have multiple transfusions and is more common with larger amounts of blood.

Under a regime of repeated transfusions, normal life and growth may be anticipated, at least for a time. According to Custer (1949), in some cases less and less blood will be required until finally the patients' marrows become adequate to support normal blood levels.

Preparations of liver, folic acid, iron and vitamin B_{12} have been tried in the United States and have had no effect. It would seem reasonable, however, to pay particular attention to the diet of these patients, and perhaps to give added iron, so that if a spontaneous remission is to occur the tools for hæmoglobin and red cell formation may be readily at hand.

Splenectomy has been occasionally effective in curing this disease according to Carl H. Smith (1947), but as he points out, the indications have never been well defined. At the present time no definite conclusion can be made as to the value of this measure.

Nature of the Anæmia.

The fundamental nature of chronic aregenerative anæmia of the newborn is at present not known. It is regarded as a congenital disease in that it develops within a short time of the birth of the infant. There is no familial susceptibility to the disease, nor any predominant sex incidence, and there are no obvious environmental factors. No drug can usually be implicated as an ætiological factor. No relationship to maternal rubella or other maternal infection can be determined. It has been suggested that the disease belongs to the group of inborn errors of metabolism, comparable with such diseases as gout and alkaptonuria, the defect in this case being an inability to produce hæmoglobin in adequate amounts for the needs of the individual. There is little evidence to support this view. For the present the disease is best regarded as a congenital hypoplasia of the erythron, comparable with congenital hypoplasia of such organs as the kidney, the organ affected in this case being the erythron, while the "leucon" and "megakaryon" are quite unaffected, just as the adrenal gland may be normal in cases of renal hypoplasia.

Report of a Case.

The patient, a male infant, was first admitted to the Children's Department of the Royal Hobart Hospital on October 16, 1951, at the age of two months with a provisional diagnosis of leuchæmia. His mother stated that he had always been rather pale, but apart from this had been well until one week before admission to hospital, when she had noticed vomiting, general irritability and anorexia. Up to this time he had been a happy baby, eating and sleeping well. His birth weight was six pounds two ounces; the pregnancy was normal, and labour was uneventful. He was the first child. His weight on admission to hospital was nine pounds 13 ounces. No other complaints were elicited on specific questioning. The child had never been jaundiced, and had had no other illnesses since birth. There was no familial

history of anæmia or any other disorder on the mother's or father's side.

On examination of the child, extreme pallor was noted and the child cried readily on slight provocation. The pulse rate was 130 per minute and the temperature was 99·2° F. The chest was clinically clear. The apex beat was diffuse and heaving, and the heart appeared clinically enlarged. A faint systolic murmur was present diffusely over the precordium. The liver was not enlarged and the spleen was not palpable. No abnormality could be found in the region of the ear, nose and throat, or in the alimentary, urinary or central nervous systems. Examination of the *fundus oculi* showed no abnormality. No petechiæ or ecchymoses could be found in the skin or mucous membranes, and there were no enlarged lymphatic glands.

A full blood examination was carried out immediately on the child's admission to hospital, with the following result. The hæmoglobin value was 3·0 grammes per 100 millilitres (22%), the red cell count was 610,000 per cubic millimetre, the colour index was 1·65, and the white cells numbered 7550 per cubic millimetre, being made up of neutrophile polymorphonuclear cells 49%, eosinophile cells 1·5%, basophile cells 2·5%, small lymphocytes 16·5%, large lymphocytes 25%, and monocytes 5·5%. No primitive white cells were present. The red cells appeared normochromic and normocytic in the film. No polychromasia, poikilocytosis, anisocytosis or macrocytosis of any significant degree was present. Platelets appeared normal in the film.

Aspiration biopsy of the tibial bone marrow was carried out on the day after the child's admission to hospital, and the following report on the film was made (a "qualitative assessment" of the specimen as described by Israëls (1948), a method of reporting that gives the maximum of information to anyone who has not examined the film):

> Total nucleated cells 164,000/cu. mm. The cellularity of the bone marrow is within normal limits for an infant. The predominant cell is the mature small lymphocyte. Granulocytes are present in all stages and their development appears normal. Megakaryocytes are present in normal numbers as also are basophiles and monocytes. Eosinophiles appear to be in increased proportions, while the reticulum cells appear to be normal. The striking feature is the virtual absence of primitive red cells. No proerythroblasts or basiphilic or hæmoglobinized normoblasts can be found. This marrow picture is diagnostic of "chronic aregenerative anæmia of infancy", an aplastic anæmia involving the erythroblastic series without affecting the myeloid cells.

A differential count of 1000 cells gave the following figures: myeloblasts 0·6%, premyelocytes 2%, neutrophile myelocytes 17·9%, neutrophile metamyelocytes (including band forms) 18·2%, neutrophile polymorphonuclear cells 5·3%, eosinophile myelocytes 3·7%, eosinophile polymorphonuclear cells 1·6%, basophile polymorphonuclear cells 0·1%, basophile myelocytes 0·3%, lymphocytes 49%, monocytes 0·4%, reticulum cells 0·3%, megakaryocytes 0·2%, mitoses (all of the myeloid series, and all neutrophile) 0·4%.

After establishment of the diagnosis, blood transfusion was commenced, and on the child's discharge from hospital on October 26 the hæmoglobin value was 17·7 grammes per 100 millilitres (127%), the red cell count was 4,910,000 per cubic millimetre, the white cells numbered 14,500 per cubic millimetre, and examination of a stained blood film showed no abnormality. He was at this time a perfectly normal baby, happy, eating and sleeping well, and of a rosy hue.

Results of other relevant tests that were carried out at the time of this admission to hospital, and before transfusion was commenced, are as follows. There was no increase in urinary urobilinogen, microscopic examination and routine chemical analysis of the urine showed no abnormality, no occult blood was present in the fæces, the platelet count was 216,000 per cubic millimetre, the reticulocytes in the peripheral blood numbered less than 0·5%, and the result of a Kline test was negative. In addition a fractional test meal examination was made, and this showed a free acid content of the fasting juice of 0·10 gramme *per centum* (30 millilitres of N/10 per 100 millilitres) and a total acid content of 0·16 gramme *per centum* (45 millilitres of N/10 per 100 millilitres). The remainder of the curve was normal. No blood or mucus was present.

After discharge from hospital he was examined in the hæmatology clinic in the out-patients' department at regular intervals. On November 9, 1951, he presented no abnormality to clinical examination, and his mother stated that he had been a normal baby in every way since discharge from hospital. His hæmoglobin value on this occasion was 100% (14 grammes per 100 millilitres) and his red cells numbered 3,940,000 per cubic millimetre. He was taking small doses of "Elixir Fergon" at this time, and this was continued. When he was next examined on December 7, 1951, his mother again regarded him as a perfectly normal baby, and said that she had had no trouble with him. On clinical examination pallor of the skin and mucosæ was noted, but no other abnormality could be found. His hæmoglobin value on this occasion was 8·4 grammes per 100 millilitres (60%), and his red cells totalled 2,730,000 per cubic millimetre. He was next seen on December 21, 1951, when his mother first noticed his pallor. He had been irritable over the preceding week, crying readily, and had vomited his feeds once or twice. On general clinical examination of the child quite definite pallor was noted, but no other abnormality was present. The spleen and liver were impalpable and there were no enlarged lymph nodes. His hæmoglobin value was 6·3 grammes per 100 millilitres (45%). Arrangements were made at this visit for his readmission to hospital for transfusion in the New Year.

He was admitted to the children's ward on January 11, 1952, and his condition on physical examination was exactly similar to that when he was first examined. It differed in no important particular, and his blood count was also similar. His hæmoglobin value was 2·9 grammes per 100 millilitres (21%), his red cell count was 580,000 per cubic millimetre, his colour index was 1·7, and his white cells totalled 14,300 per cubic millimetre, being made up of neutrophile cells 65%, basophile cells 1%, small lymphocytes 8%, large lymphocytes 25% and monocytes 1%. The red cells appeared normochromic and normocytic. No primitive red or white cells were present.

Aspiration biopsy of the tibial marrow was repeated and showed no significant deviation from the previous findings. There were 115,000 nucleated cells per cubic millimetre, and a differential count of 1000 cells gave the following figures: myeloblasts 0·5%, premyelocytes 1·5%, neutrophile myelocytes 17·3%, neutrophile metamyelocytes (including band forms), 22·4%, neutrophile polymorphonuclear cells 16·9%, eosinophile myelocytes 1%, eosinophile polymorphonuclear cells 1·7%, basophile myelocytes 0·6%, basophile polymorphonuclear cells 0·3%, lymphocytes 35·7%, monocytes 0·6%, plasma cells 0·1%, reticulum cells 0·9%, megakaryocytes 0·1%, mitoses (all of the neutrophile series) 0·4%.

Once again transfusion was commenced, this time a marrow infusion given by connecting the giving set to the marrow biopsy needle, which was left *in situ* after the performance of aspiration. It was discontinued the next day after the giving of 400 millilitres of blood, when some signs of overloading of the circulation developed, but apart from this the marrow transfusion was without event.

The child was discharged from hospital five days later on January 16, 1952. His hæmoglobin value was 13·2 grammes per 100 millilitres (94%), his red cell count was 4,030,000 per cubic millimetre, his colour index was 1·1, and his white cells numbered 12,900 per cubic millimetre. The stained film showed no abnormality.

Comment.

The following points relating to chronic aregenerative anæmia of the newborn are worthy of reemphasis.

1. Severe anæmia in a baby constitutes the only symptom, and when this is corrected by replacing the missing red cells with transfused cells the patient returns to normal. In the present instance the baby was for a time completely normal in between transfusions.

2. The anæmia is normochromic and normocytic. Perusal of a stained film of the peripheral blood in this case shows no very definite abnormality apart from a paucity of red cells. The white cells and platelets appear normal. The high colour index of this baby is not of significance, as this index—notoriously fallacious, though for all that sometimes a useful guide—is so often high when the red cell count falls below 1,000,000 per cubic millimetre. This is confirmed by an examination of the film, which fails to show any macrocytosis.

3. The unusual findings in the bone marrow are sufficiently characteristic to be pathognomonic. In the present case one or two proerythroblasts were found in the second marrow specimen after prolonged search of the preparations made, but none were found in the first specimen, and in neither case were any nucleated red cells seen when a systematic differential count of 1000 cells was undertaken.

XUM

The differential percentages of the myeloid cells in both cases show no significant deviation from normal apart from the lymphocytosis, which is usual in the marrow of infancy and childhood, and a definite mild increase in the total eosinophile cell count in the first specimen. Minor variations in the percentages of premyelocytes, myelocytes, metamyelocytes and polymorphonuclear cells are not of importance. The reticulum cells were not proportionately increased in either of the specimens obtained.

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Reviews.

HORMONES.

"Hormones: A Survey of Their Properties and Uses" is a composite work by several writers on different aspects of the hormones.[1] It is divided into eight chapters on the following subjects: history, physiology, chemistry of non-steroid hormones, chemistry of the steroid hormones, standardization, action and uses, pharmacy, commercial preparations.

The sections on physiology and on action and uses, by Dr. H. E. Dale, are very well done at about the standard of a good text-book of physiology. The section on the chemistry of non-steroid hormones, by Dr. Hey, is very brief, but the section on the chemistry of steroid hormones, also by Dr. Hey, is very extensive; there are 180 constitutional formulæ of steroids. The section on standardization is too extensive for general reading, but not long enough to be very useful. The chapter on pharmacy deals with some of the pharmaceutical preparations of hormones and prescriptions for their exhibition. The section on commercial preparations is merely a list extending over fourteen pages of available preparations with the doses and makers.

While there is much that is very good in this book, it is difficult to see for whom it is intended. For the medical man the chemistry is much too detailed, for the pharmacist there is much that cannot be very useful, and for the student a good text-book on physiology will give all that is necessary.

CLINICAL ALLERGY.

Dr. Samuel J. Taub in his second edition of "Clinical Allergy" has certainly catered very efficiently for the general practitioner and medical student.[2] He has carefully avoided theory and technical details which would be of interest only to the specialist in allergy and has confined discussion to the common, everyday difficulties in the allergic field. Examples of this are the chapters allotted to those conditions which are a mixture of allergy and infection and to the question of how to determine which is the primary disorder in such patients, and also to details helpful in deciding the diagnosis of allergic rhinitis from acute coryza or common cold. Other useful chapters are those devoted to desensitization of patients displaying sensitivity to penicillin and liver extract, in which a detailed account of the routine procedure is clearly set out. The appendices supplying information regarding the problems of extracts, recipes and the comprehensive list of the common inhalant, ingestant and contact allergens and their sources are most informative. The rather scant information regarding the use of cortisone and ACTH generally is surprising, as is the author's suggestion that allergic individuals should not intermarry. Dr. Taub set out to supply a useful and practical book, and he has certainly done his work well.

[1] "Hormones: A Survey of Their Properties and Uses", published by direction of the Council of the Pharmaceutical Society of Great Britain; 1951. London: The Pharmaceutical Press. 9" x 6", pp. 232, with 34 illustrations. Price: 35s.

[2] "Clinical Allergy: A Practical Guide to Diagnosis and Treatment", by Samuel J. Taub, M.B., F.A.C.P.; Second Edition; 1951. New York: Paul B. Hoeber, Incorporated. 9½" x 6½", pp. 282. Price: $4.50.

ISOTOPES IN BIOCHEMISTRY.

The book entitled "CIBA Foundation Conference on Isotopes in Biochemistry" is a collection of papers on the use of isotopes in certain aspects of biochemical research with the discussions on the papers given at a conference held under the auspices of the Ciba Foundation.[1] As the authors are among the most prominent biochemists working with isotopes the standard of the papers is very high. The papers are divided into five sections dealing with the following subjects: steroids; hæmoglobin and metabolic derivatives; use of tracers in the study of biological effects of radiation; nucleic acids, proteins and aminoacids; carbohydrate and fatty acid metabolism. There are in all 23 papers each with a discussion. The papers cover a wide range of biochemical research at the most advanced level and show clearly what very useful tools the isotopes have become in the elucidation of difficult metabolic problems.

This is a book for advanced students and research workers in biochemistry and would be of little use to the average medical reader. To anyone with sufficient basic knowledge the book is extremely valuable.

THE PHARMACOLOGIC PRINCIPLES OF MEDICAL PRACTICE.

The appearance of a second edition of "The Pharmacologic Principles of Medical Practice", following several reprints of the first edition published in 1949, pays tribute both to the merited popularity of the work and to the industry of the authors—Krantz and Carr.[2]

The arrangement of the subject matter remains substantially the same as in the previous edition, the treatise being divided into several parts each dealing with the responses of individual systems to relevant drugs. Each section is introduced by a synopsis of the physiological and biochemical activities of the system under review—an approach which facilitates interpretation of the activities of appropriate drugs in terms of these basal sciences.

In consonance with pharmacological advances, extensive revisions have been made, new and interesting chapters and articles added, and the text brought into line with the Fourteenth Revision of the United States Pharmacopœia and other officially recognized publications.

In that it covers the range of current therapeutic agents with such uniform merit it is invidious to comment on individual sections. However, a few random selections will perhaps indicate its scope and versatility.

To many worthwhile chapters devoted to the anti-infective drugs, the second edition adds a new one devoted to the chemotherapy of tuberculosis. Here are considered the relative merits of streptomycin, para-aminosalicylic acid, the sulphones and the thiosemicarbazones given singly and in association. There is a note of homely wisdom in the

[1] "CIBA Foundation Conference on Isotopes in Biochemistry"; editor for the Ciba Foundation, G. E. W. Wolstenholme, O.B.E., M.A., M.B., B.Ch.; 1954. London: J. and A. Churchill, Limited. 8½" x 5½", pp. 304, with 79 illustrations. Price: 27s. 6d.

[2] "The Pharmacologic Principles of Medical Practice: A Textbook on Pharmacology and Therapeutics for Medical Students, Physicians, and the Members of the Professions Allied to Medicine", by John C. Krantz, jnr., and C. Jelleff Carr; Second Edition; 1951. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9½" x 6½", pp. 1134, with 95 illustrations, a few being in colour. Price: £5 7s. 6d.

observation that these agents are not substitutes for, but adjuncts to, routine sanatorium care and education, collapse therapy and other surgical procedures.

In another chapter in this section, the rickettsial diseases are reviewed and the replacement of their earlier treatment with para-aminobenzoic acid by the antibiotics chloramphenicol, aureomycin and terramycin is described.

"Anti-Motion Sickness Drugs" forms the title of an article of present interest. This rather features the well-known drug "Dramamine"—a molecular compound of the antihistaminic "Benadryl" with chlorinated theophylline. In that "Benadryl" has a definite para-sympatholytic action comparable with that of atropine, produces a cerebral depression like that of hyoscine, and is soporific like the barbiturates, the authors maintain that it offers little novel in therapy—and infer that a "Benadryl"-hyoscine combination might yet be the answer in more comprehensive trials.

Under the heading of "Autonomic Ganglionic Depressants" is a moderate, well-balanced article dealing with the inhalation of that "very complex aerosol", tobacco smoke, with its constituent "poison of enjoyment", nicotine. The discussion, embracing such aspects as tobacco tar carcinogens, the relation of smoking to general health and longevity and specific contraindications based on pharmacological evidence, does not "tranquillise the troubled spirit" quite so effectively as a good cigarette.

Among other interesting discussions are the relative merits of tubocurarine, mephenesin and syncurine (decamethonium bromide) as muscle relaxants; addictive aspects of analgesics of the "Demerol" and methadone type and the general problem of drug addiction; an assessment of the merits of the many mercurial diuretics in common use; and cortisone and ACTH in relation to the arthritides.

Whether the reader's primary interest in the wide subject of pharmacology is chemical, physiological, biochemical or purely therapeutic, "Krantz and Carr" caters for it in a comprehensive and thoroughly satisfying treatise.

CLINICAL PATHOLOGY.

THE sixth edition, dated 1951, of "Clinical Pathology" by Panton and Marrack was prepared and the final proofs were read by the senior author, Sir Philip Panton, before his death, and while there has been much revision and some rearrangement of the subject matter, the book retains the basic form and coverage of earlier editions.[1] There are some sixty more pages than in the previous edition, and the volume is appreciably thicker, bearing witness to the better type of paper used. In the arrangement of the book the laboratory procedures are separate from the theoretical discussions. The book is not meant to provide a full exposition of its subject, but it is very readable and useful. Its five hundred odd pages will be a worthwhile addition to the bookshelves of students, residents and practitioners generally for its descriptions of conditions and relevant tests. Laboratory workers will find it particularly helpful, especially in the smaller laboratories.

The new edition has been brought up to date; we may mention among other features the Coombs test, and tests of sensitivity of organisms to and assays of the newer antibiotics such as "Chloromycetin" and aureomycin. There is new and additional material on fungi, hormones, vitamins *et cetera*, while there has been (wisely) an elimination of descriptions of morbid histology, with retention of basic techniques. The plates and text illustrations, although not numerous, are clear and instructive.

ORTHOPÆDIC NURSING.

WHEN Sir Robert Jones founded the modern precepts of orthopædic surgery, he had Dame Agnes Hunt to aid him ably on the nursing side, and so it is very fitting to find that in the work "Orthopædic Nursing", by Mary Powell,[2] the foreword is by Sir Reginald Watson-Jones, whilst the book itself is dedicated to the memory of Dame Agnes Hunt. There is no branch of surgery in which the nursing and after-care are more important than orthopædics, and in this book nurses are provided with complete descriptions of all procedures ranging from plaster technique to the nursing of children suffering from knock-knees. The fact that some 32 pages are devoted to splints and appliances shows the extent of detail to which the author has gone to make this book a complete treatise on the subject, and some 210 photographic illustrations are a very valuable addition to the written text. No mention is made of the nurse's duties in the operating theatre, and for the sake of completeness, details of the "no touch" technique, as well as other operating details, would be most useful. Masseuses and surgeons as well as nurses will find that this worth-while book contains much practical material which will aid them in the care of their orthopædic patients.

[1] "Clinical Pathology", by H. B. May, M.A., M.D. (Cantab.), M.R.C.P. (London), and J. R. Marrack, M.A., M.D. (Cantab.); Sixth Edition; 1951. London: J. and A. Churchill, Limited. 9" × 6", pp. 524, with 16 plates, 10 in colour, and 28 illustrations. Price: 30s.

[2] "Orthopædic Nursing", by Mary Powell, S.R.N., M.C.S.P., Orthopædic Nursing Certificate, with a foreword by Sir Reginald Watson-Jones, B.Sc., M.Ch.Orth., F.R.C.S.; 1951. Edinburgh: E. and S. Livingstone, Limited. 9" × 6", pp. 412, with 209 illustrations. Price: 25s.

INSTRUMENTS AND APPARATUS IN ORTHOPÆDIC SURGERY.

"INSTRUMENTS AND APPARATUS IN ORTHOPÆDIC SURGERY", by E. J. Nangle, is a useful book for country practitioners, orthopædic sisters and splint makers, and Mr. Nangle is to be congratulated on his endeavours to fill a long-felt want and on the manner of its production.[1]

Unfortunately, nursing details are deficient, and the number of splints dealt with is rather limited, whilst too many pages are devoted to chemical formulæ and constructional details to render this book of value to nurses in training.

Orthopædic surgeons will find much useful information in this new publication, which is divided into fifteen chapters and includes the following material: the principles of splinting; a very useful and detailed chapter on mechanical respirators; plaster-of-Paris technique in general and with special regard to plaster jackets and beds; the construction and use of various types of metal splints; a most informative chapter on counter-weighted appliances—with excellent illustrations regarding the use of the Hoskins beam; a short chapter on foot appliances and shoe adjustments followed by one on surgical boots by W. H. Tuck; finally a chapter on plastics by J. T. Scales.

The book contains many illustrations of high quality.

Future editions could be improved by extending the scope of the book to include greater detail regarding the application of splints and the nursing of patients in such cases, together with a chapter on the complications and dangers associated with the use of splints of all kinds.

APPLIED ANATOMY FOR NURSES.

THE fact that one author is a tutor sister and the other a professor of anatomy, probably has helped a lot in producing such an essentially practical work as "Applied Anatomy for Nurses" by E. J. Bocock and R. Wheeler Haines.[2] Nurses naturally need to know far less anatomy than doctors, but in the writing of a book for them it is difficult to include just enough detail and not too much, which is perhaps too often the tendency of doctors writing for nurses; however, in this book there is a nice sense of balance, and this is the main factor that makes it so readable. As is stated in the preface, the subject has been dealt with in a regional manner so as to present a smooth flow from one chapter to the next. Some of the details, as in the chapter on blood, are rather more physiological than anatomical, but by their inclusion the student nurse is given a concise picture of the whole make-up of the blood-stream, which is just what she wants. Besides gross anatomy, some mention is made also of histology and embryology as well as of details of the structures associated with the special senses. Throughout the book are some 231 illustrations, many of them semidiagrammatic; all are excellent and enhance the text greatly. No nurse or tutor sister need look further than this book for all her needs in the study of anatomy.

[1] "Instruments and Apparatus in Orthopædic Surgery", by E. J. Nangle, M.B., Ch.B., F.R.C.S.; 1951. Oxford: Blackwell Scientific Publications. 10" × 7½", pp. 246, with 200 illustrations. Price: 42s.

[2] "Applied Anatomy for Nurses", by E. J. Bocock, S.R.N., S.C.M., D.N., and R. Wheeler Haines, M.B., D.Sc., F.L.S. Edinburgh: E. and S. Livingstone, Limited. 8½" × 5½", pp. 332, with 231 figures. Price: 15s.

Notes on Books, Current Journals and New Appliances.

"SHORE."

All old boys of "Shore" (The Sydney Church of England Grammar School), of whom there are many in the medical profession in many parts of Australia, will welcome the appearance of a small book entitled "Shore", which has been written by Emeritus Professor E. R. Holme.[1] Professor Holme has been for over fifty years a member of the school council. The subtitle of his book is "The Foundation and First Headmastership Viewed from the School's Sixtieth Year". "Shore" has had four headmasters. The first, Ernest Iliff Robson, was appointed in 1889 and resigned in 1900, Charles Henry Hodges was headmaster from 1901 to 1910, William Alexander Purves was headmaster from 1910 to 1922. The present headmaster, Leonard Charles Robson, was appointed in 1923. The first and last headmasters are not related. Professor Holme's book deals mainly with the first headmastership. Clearly Professor Holme's work has been a labour of love and he is to be congratulated upon it. He has published some interesting photographs. This is not the place to tell the story of the first headmastership and of the "crisis" which ended it. That is something which all old "Shore" boys will like to read.

SURGICAL NURSING.

The well-known text-book on surgical nursing by H. C. Rutherford Darling has reached the tenth edition.[2] The first edition was published as long ago as 1917; the tenth edition appeared in 1951. Dr. Rutherford Darling has now handed the book over to Dr. T. Edward Wilson, though the names of both appear on the title page. The book is well known to nurses in Australia and to doctors who have to teach them. It needs no introduction. A quick glance through the book revealed one or two imperfections which might be corrected. In discussions on diets for diabetics the word "Calorie" is printed with a small letter. A capital letter should be used as indicating the great Calorie which is 1000 times greater than the small calorie, spelt with a small letter. Tests are described for the discovery of albumen in the urine. This, of course, should be albumin; albumen comes from the egg of a hen. The name of Trendelenburg is incorrectly spelt on page 199. We wish Dr. Wilson success in his sponsorship of this volume.

"FAMILY DOCTOR'S" FIRST BIRTHDAY.

Rosemary Jane, "glamour girl" of "Family Doctor", is one year old, and so with its issue of April, 1952, is "Family Doctor". Both have developed uncommonly well and are gaining in general favour, but there must be many doctors and patients who have still not made their acquaintance. This should be remedied at once—the annual subscription is one pound (sterling) including postage and the Australian agents are Gordon and Gotch (Australasia), Limited. The April issue has articles on the world war against disease, the change of life, 'teen-age problems, tight hats and baldness, feeding difficulties with children, the ear, the adoption of children, intelligence tests, breast feeding, hypochondriacs, home cooking and much more. It is attractively presented, sound and instructive, and it ranges in entertainment value from interesting to thoroughly funny. Doctors should prescribe it for themselves, their families and their patients.

[1] "Shore: The Sydney Church of England Grammar School: The Foundation and First Headmastership Viewed from the School's Sixtieth Year", by E. R. Holme, O.B.E., M.A., with a foreword by His Grace the Most Reverend the Archbishop of Sydney; 1951. Sydney: Angus and Robertson. 8¾" × 5¾", pp. 168, with 38 illustrations.

[2] "Surgical Nursing and After-Treatment: A Handbook for Nurses and Others", by H. C. Rutherford Darling, M.D., M.S. (London), F.R.C.S. (England), F.R.F.P.S. (Glasgow), and T. Edward Wilson, M.D., M.S., M.Sc. (Melbourne), F.R.C.S. (England), F.R.C.S. (Edinburgh), F.A.C.S., F.R.A.C.S., M.R.A.C.P.; Tenth Edition; 1951. London: J. and A. Churchill, Limited. 7¾" × 5", pp. 640, with 188 illustrations. Price: 16s.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Annual Report on Stress", by Hans Selye, M.D., Ph.D. (Prague), D.Sc. (McGill), F.R.S. (Canada); 1951. Montreal: Acta-Incorporated. 9¼" × 7", pp. 676, with many illustrations. Price: $10.00.

Intended to be a guide to the entire literature on stress and a critical correlator of pertinent facts.

"Clinical Radiology of the Ear, Nose and Thorat", by Eric Samuel, M.D. (London), F.R.C.S. (England), F.F.R. (London), D.M.R.E. (Cambridge); 1952. London: H. K. Lewis and Company, Limited. 10" × 8", pp. 348, with 320 illustrations. Price: 70s.

Intended for the practising radiologist and the radiological student.

"The Advance to Social Medicine", by René Sand; 1952. London: Staples Press. 9" × 6", pp. 668. Price: 42s.

A history of the development of medicine in the various aspects up to and including the advent of social medicine.

"Untoward Reactions of Cortisone and ACTH", by Vincent J. Derbes, M.D., F.A.C.P., and Thomas E. Weiss, M.D.; 1951. Oxford: Blackwell Scientific Publications. 9" × 6", pp. 58. Price: 8s. 6d.

The subject is discussed in ten short chapters.

"The Management of the 'Hopeless' Case", by C. J. Gavey, M.D., F.R.C.P.; 1952. London: H. K. Lewis and Company, Limited. 9" × 6", pp. 52, with one illustration. Price: 9s.

This essay was awarded the Buckston Browne Prize of the Harveian Society of London.

"Industry and Tropical Health: Proceedings of the First Industrial Tropical Health Conference, Sponsored by the Harvard School of Public Health, December 8-10, 1950, at Boston, Massachusetts"; 1951. Boston: The Harvard School of Public Health, for the Industrial Council for Tropical Health. 11" × 8", pp. 316, with many illustrations. Price: $10.00.

The proceedings are published in twelve sections in which the proceedings of the twelve sessions are reported.

"The Surgical Clinics of North America"; 1951. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. Philadelphia Number. 9" × 6", pp. 336, with 86 illustrations. Price: £7 5s. *per annum* (cloth binding) and £6 *per annum* (paper binding).

This is a Philadelphia number. It comprises a symposium on abdominal surgery with two articles, and a group of three articles on cardio-vascular surgery.

"Mind: A Social Phenomenon Illustrated by the Growth of Medical Knowledge", by F. S. A. Doran, M.A., M.D. (Cantab.); 1952. London: Watts and Company. 8" × 5¼", pp. 186. Price: 10s. 6d.

The author thinks that the facts support the assumption that the mind is an expression of brain function.

"Problems of Consciousness: Transactions of the Second Conference, March 19-20, 1951, New York"; 1951. New York: Josiah Macy Junior Foundation. 9" × 6¼", pp. 178. Price: $3.25.

The subjects discussed included the nature of consciousness, and variations in the scope of awareness and in states of awareness in schizophrenic patients.

"Connective Tissues: Transactions of the Second Conference, May 24-25, 1951, New York"; 1952. New York: Josiah Macy Junior Foundation. 9" × 6¼", pp. 190, with 80 illustrations. Price: $3.50.

Five different subjects were considered at the conference.

The Medical Journal of Australia

SATURDAY, APRIL 26, 1952.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

REVOLUTIONARY STUDIES IN CARDIAC MOVEMENT.

Physicians of the Victorian era depended entirely upon the evidence of their eyes, ears and fingers in clinical practice. In the field of cardiac research, relatively crude mechanical instruments and elementary electrical circuits served to record their findings. There were no modern anæsthetics or antibiotics to help in animal experimentation. Nevertheless, James Mackenzie, Krogh, Wiggins, Einthoven and many more tilled the hard soil of normal and abnormal cardiac rhythms so efficiently and so convincingly that the fruits of the firm trees of hypothesis and knowledge which they planted have satisfied the intellectual appetite of succeeding medical generations for almost fifty years.

The concept of "circus movement" as the mechanism of perpetuation of auricular flutter and auricular fibrillation was formulated by Thomas Lewis in 1912. Between 1912 and 1918 he and his co-workers at University College, London, appeared to have proven, by careful electrocardiographic measurements, that auricular flutter in the dog was originated and continued by a circulating wave of electrical excitation which commenced in the region of the inferior *vena cava*, passed up the right auricle to the auricular appendix, and then returned to the inferior *vena cava* by the interauricular band. The time of arrival of the wave at these points was measured to one ten-thousandth of a second by direct leads, but it was not possible to explore electrically the body of the left auricle, and the completion of this half of the auricular circuit was, as Lewis admitted, no more than a reasonable assumption. From these "mother waves", circulating continuously at a rate of 260 to 320 per minute, centrifugal waves arose, which stimulated the remaining parts of the auricle. Some were blocked, others reached the auriculoventricular node. In one patient with flutter Lewis analysed the changing axis of the wave, which he thought also confirmed the theory, as it appeared to traverse 360° during the progress of a full auricular cycle, although in a direction opposite to that taken in the experimental animal. These ideas completely dominated physiological discussion of this subject for thirty years, such was the care and force by which they were presented from the laboratory of one of the most critical experimentalists of his day. The pharmacology and clinical success of quinidine and digitalis became uniformly explained on the basis of this hypothesis. Doubt as to the existence of such a mechanism subsequently arose when Brams and Katz surgically severed the supposed pathway in a dog's auricle without terminating the flutter, and when Scherf and his associates produced flutter by the application of aconitine to the auricular wall remote from the pathway, and terminated the arrhythmia at will by cooling the aconitine focus.

Recently, techniques providing direct visual appreciation of auricular movement in all parts of both auricles of a dog, together with œsophageal and precordial electrocardiography in man, have so conclusively failed to support the existence of any circus movement, that it is certain to depart forever from future physiological discussions. In a small hospital on the outskirts of Hollywood in California, Myron Prinzmetal has succeeded in surrounding himself with an unusual medical team, consisting of physicists, engineers, photographers and research fellows. With their aid he has brought to bear the modern resources of high-speed colour photography, developed in the neighbouring film studios, to the elucidation of cardiac movement.[1] Experimentally produced auricular flutter in forty dogs was directly visualized in coloured cinematographs, recorded at the amazing speed of 2000 frames per second. When such a film is projected at a normal running speed, the auricular movement is slowed to the extent of being obvious to any human eye, usually the last court of appeal even amongst the most cynical and incredulous. In this way the site, rate and rhythm, mode of spread, and form of contraction and relaxation could be studied and restudied at will. It was visually incontestable that, regardless of the site of experimental production of the arrhythmia, the contraction wave of auricular flutter arises at the ectopic focus and spreads as a broad band involving the entire width of the right auricle in all directions simultaneously. Each contraction wave is followed by a wave of relaxation arising at the same site and pursuing an identical course. There are no daughter waves, nor does the wave turn above the superior *vena cava* and then enter the left auricle. Timing of these observed waves did not support Lewis's theory that the intervals between departure and return of the wave from one end of the circuit to the other were identical. In the cinematograph film, the interval between the onset of successive contractions was as much as eight times that required for the wave to complete its traverse. The pictures show further that, in flutter, the two auricular appendices contract together, whereas, according to Lewis's calculations, the right appendix should contract 0·057 to 0·067 second before the left. Under the conditions of high-speed photography this difference would be amplified to an interval of fourteen seconds. By

[1] *The American Journal of Medicine*, October, 1951.

inflicting deep transmural burns on the auricle in the path of a supposed circus movement, Prinzmetal failed to arrest experimental flutter. Contraction waves can be seen to spread concentrically, as when a stone is dropped in a pond, and not pursue any one unidirectional course. In this simple but convincing way, which transcends the difficulties of language and mathematics, Prinzmetal has effectively disposed of the favourite theory of his old master, at least as far as the behaviour of the fluttering dog's auricle is concerned.

It remained to apply the yardstick of modern semi-direct lead electrocardiography to auricular flutter in man. The back of the heart or auricular surface can be approached via the œsophagus, and the anterior or ventricular aspect from the precordial surface. The distance between the incisor teeth of man and various levels of the left auricle which impinge on the œsophagus is known with reasonable precision. By comparison with simultaneous tracings from strategic sites on the exposed auricles of the dog, or from œsophageal or precordial leads of man, it was possible to repeat and extend Lewis's electrocardiographic determinations of the course taken by the flutter wave through the left auricle. At any instant, the site and direction of the excitation wave could be plotted by electrocardiographic "cross-bearings", as it were. Thus a confirmatory and objective electric eye was substituted for that of the astonished spectator of the coloured film. Several experiments similar to those observed all directly confirmed the absence of any sign of unidirectional circus movement, and in each case, both in the experimental animal and in man, auricular flutter consisted of rapidly recurring waves which spread out from the ectopic focus in all directions simultaneously. In no lead did the auricular complex assume an "M" shaped form, which an excitation circulating continuously in Lewis's area would be expected to produce. In each of six patients exhibiting the common type of auricular flutter, the course of the excitation wave was determined by comparing the times of onset of the intrinsicoid deflections in simultaneously recorded œsophageal leads from different auricular levels. These readings indicated that the wave was travelling upwards through the auricles in a linear and not a circular course. The speed of the excitation wave was approximately 125 centimetres per second. In normal sinus rhythm the wave travelled at approximately 500 centimetres per second. The slower rate of travel of the excitation wave in auricular flutter was noted by Lewis, and confirmed by Prinzmetal. In a small minority of instances of auricular flutter, the excitation waves pass downwards, that is, in a cephalocaudal direction only. The form of the auricular or flutter deflections in precordial leads was also electrocardiographically inconsistent with a circulating wave which rhythmically approached, and then receded from, the chest electrode.

Prinzmetal and his associates further offer a likely explanation of the curious regular "saw-tooth" oscillation of the base line, which is such a striking and constant feature of classical limb lead electrocardiograms. Lewis believed that this diphasic wave form was directly due to rotation of the electrical axis of the auricular excitation wave through a full circle. "This revolution gives us", he said, "incontestable evidence that the movement of the excitation wave throughout the auricle as a whole is controlled by a re-entrant movement around a circle or an ellipse." Prinzmetal believes that the diphasic "flutter complex" of the limb lead is an exaggeration of the normal processes of depolarization and repolarization of the auricle, which in the normal heart are represented by the upright *P* wave and the downward *Ta* wave. Usually the *Ta* wave is obvious only in the long *P-R* interval of early heart block. Heart block is almost invariably present in flutter, and this, together with the accentuation of auricular rate, causes a "bunching up" of these deflections into a "saw-tooth" pattern. By comparing simultaneous tracings from each end of the auricle with unipolar limb leads in experimentally induced flutter, it could be seen that a specific limited portion of the flutter complex in limb leads could be called the P^1 wave of auricular flutter, in conformity with the terminology accepted to designate a similar section of the total complex in auricular extrasystoles and auricular paroxysmal tachycardia. The momentary axes of this part of the complex do not move around 360° and this provides additional argument against any circus movement. More striking experiments consisted in observation of the *P* or P^1 wave during gradual acceleration from normal sinus rhythm to auricular flutter following the application of aconitine to the body of the right auricle near the inferior *vena cava*. With the gradual increase in auricular rate, the configuration of the inverted P^1 wave remained constant, but the P^1-*R* interval lengthened, an upright *Ta* wave appeared and 2:1 heart block developed. These changes were sufficient to produce the undulating appearance of flutter. It should be noted that during the whole of the transition from tachycardia to flutter the form of the P^1 wave remained strictly unaltered. When the site of the ectopic focus, originating the flutter, deliberately changed, the form of the *P* wave altered, just as occurs with single ectopic beats or auricular tachycardia. The magnitude of the electro-positive *Ta* wave in flutter, that is, the other or remaining half of the "saw-tooth", depends largely on the auricular rate. At high auricular speeds, disturbances of repolarization processes perhaps occur and may modify voltage.

In 70% of 139 patients with auricular flutter, Prinzmetal *et alii* found an inverted P^1 wave in leads II and III, indicating that the excitation wave arose in the caudal region of the auricles. In 15% the P^1 wave was positive in leads I and II, indicating that the cephalic extremity of the auricle was the seat of the ectopic focus. In the remaining 15% it was not possible to make this differentiation. A less striking analysis of 107 patients with auricular tachycardia suggested that the majority arose from an ectopic focus at the opposite or caudal end of the auricle.

Acceptance of Prinzmetal's observations and deductions means acceptance of the essential unity of auricular tachycardia and auricular flutter. Both arrhythmias may be produced by stimulation of a single site in the auricle; both arrhythmias terminate when the site of stimulation is inactivated. In both, the excitation and contraction waves are propagated in a similar manner and pursue an identical linear course, without reentry. The only distinction is their rate of impulse formation, and perhaps a tendency to originate at opposite ends of the auricle. If no fundamental distinction exists between the mechanisms, why does tachycardia often respond to vagal stimulation,

for example, by carotid sinus massage or digitalis, while flutter does not? Why is flutter a faster and more prolonged auricular disturbance? Why does flutter have a closer relationship to fibrillation and to organic heart disease? Why is auricular tachycardia more amenable than flutter to quinidine therapy? These are questions posed by the clinician rather than by the physiologist. Prinzmetal has satisfied the latter, and in a less objective manner answers the former as follows. He has shown that the configuration of the auricular deflection in standard lead electrocardiograms is purely a question of auricular rate and does not provide a reliable criterion for differentiation, especially in borderline cases. The presence of auriculo-ventricular block is again a question of rate, concerned with the minimal refractory period of the junctional tissues. Thus prominent *Ta* waves and auriculo-ventricular block occur together. In the experimental animal, vagal stimulation causes asystole only at a critically slow rate. Above this, it is ineffective or converts flutter into fibrillation (Lewis). Hence the response of tachycardia and of flutter to vagal stimulation varies with the auricular rate rather than with the mechanism of the arrhythmia. Both flutter and tachycardia represent the discharge of impulses from an ectopic focus, and at a rate between the rate of discharge from the sinus node and the fibrillation threshold. Quinidine raises the threshold of auricular excitability at any given auricular rate, and does not act by closing a hypothetical gap in a circus pathway. Normal rate is restored when the ectopic focus becomes less active than the sinus node.

It is tempting to speculate that the more cephalic the situation of the ectopic focus, the more is it subject to vagal control, but there are many individual differences in sensitivity and clinicians will recall many varieties of attack in the one subject, some of which are readily controlled by vagal excitation, some not. The explanation of the acceleratory effect of quinidine in some instances is not yet clear. The irritable focus which arises as a result of organic muscle damage, initiates higher auricular rates than that mediated by toxic or nervous influences. There are still such relationships to morbid states to be elucidated, but Prinzmetal appears to have made out an incontestable case for the unity in mechanism, and even terminology, of paroxysmal tachycardia and of flutter. He had the courage to show his film in the hospital in which he had worked with Lewis. In his accompanying remarks, he paid a deep tribute of respect to this strict and brilliant scientist, who, lacking the high-speed cameras, the multichannel direct writing recorders of today, and the advantage of Wilson's laws of electrocardiography, had produced a logical and useful hypothesis, which had served two generations well. Prinzmetal and his group were not the first to doubt its veracity, and shrewd clinicians like William Evans were equally dubious, but they had the opportunity, the energy and the vision to apply a new visual technique to human dynamics. Not only have they shattered a long-held tenet of cardiology with ruthlessness and conviction, but the tools have been prepared for further explorations into the physiological dynamics of animal and man, so that no one can say what other intimate visceral mechanics may soon be revealed to our astonished gaze.

Current Comment.

THE USE OF RADIOACTIVE IODINE IN THE ASSESSMENT OF THYROID FUNCTION.

The thyroid gland takes up inorganic iodine from the circulating blood and the gland can concentrate the iodine up to 10,000 times. Investigations with ordinary iodine salts are very difficult and some are impossible in the living human being. When radioactive iodine became available the field of research and the ease in observation greatly increased. At first I^{130} was used, but as this has a half-life of only twenty-five minutes its value was limited. Now I^{131} is used with a half-life of eight days. The concentration of radioactive iodine in the thyroid gland and in the circulating blood can be determined by the use of the Geiger counter suitably screened. When a dose of radioactive iodine is given, either orally or intravenously, a large part of the dose is collected by the thyroid gland. That part of the iodine which is not taken up by the thyroid gland is excreted by the kidneys at a rate which, in the absence of renal disease, is fairly constant, depending on the concentration of the iodine in the circulating blood. There is therefore a constant state of competition between the thyroid gland and the kidneys to collect circulating iodine and any increase or decrease in thyroid activity is reflected in diminished or increased amounts excreted in the urine. Studies of the urinary excretion of the isotope have been widely used as an indirect index of thyroid function. The rate of uptake of radioactive iodine by the thyroid gland obtained by external counting with a Geiger counter over the gland and simultaneous determination of the concentration of radioactive iodine in the plasma has been investigated by a number of observers in normal and diseased conditions of the gland. A simple clinical test is provided by the ratio of the counts obtained with a Geiger counter, one hour after a dose, over the thyroid gland to the counts obtained at the same time over the thigh. It is generally agreed that the presence of increased amounts of circulating thyroid hormone is responsible for the clinical manifestation of thyrotoxicosis, and any method of determining such an increase should be a useful index of thyroid function. It has been shown in animals that circulating thyroid hormone is probably thyroxine itself.

J. F. Goodwin, A. G. Macgregor, H. Miller and E. J. Wayne have developed a method based on the assumption that an estimation of protein bound iodine, separated from the non-protein bound fraction by precipitation with trichloracetic acid, is essentially a measure of the thyroxine content of the plasma.[1] They have studied 16 normal subjects, 30 patients in an "intermediate" group with non-toxic goitres, treated thyrotoxicosis or anxiety states, 44 patients with thyrotoxicosis or toxic adenomata, four patients with myxœdema, one with acromegaly and one with Hashimoto's thyroiditis. The metabolism of orally administered radioactive iodine was studied in each group with respect to the rate and degree of uptake of the isotope by the thyroid gland, the urinary excretion in the first twenty-four hours, the thyroid clearance rate of iodine from the plasma, the amount of activity due to isotope found in the plasma forty-eight hours after the dose was given, and the radioactive iodine in protein-bound form in the plasma. Basal metabolic rate determinations were also made, but these were not very useful. Characteristic patterns of behaviour of the administered iodine were found for each group in respect of each criterion investigated. The clinical state of each patient was assessed independently by three observers. The gland uptake at its peak value showed a range of 21% to 54% in the normal group, 24% to 69% in the intermediate group, and 56% to 92% in the toxic group. The time measured to the moment at which the thyroid gland had absorbed half the iodine retained at the peak was 160 minutes for normal thyroid function and under 100 minutes in thyrotoxicosis. Inter-

[1] *The Quarterly Journal of Medicine*, October, 1951.

mediate times occurred in both clinically normal and thyrotoxic subjects. Thyroid iodine clearance rates in normal persons were commonly below 50 millilitres per minute and usually above 80 millilitres per minute in the presence of thyrotoxicosis. The twenty-four-hour urinary excretion of the isotope showed that excretion of under 20% of the dose was usual with clinical evidence of toxicity and excretions of over 35% with normal function. Intermediate excretions were found both in mild thyrotoxicosis and in non-toxic goitre. Estimation of protein-bound plasma activity forty-eight hours after administration of the dose showed a very sharp division between normal and thyrotoxic subjects. Values in excess of 0·4% of the dose per litre of plasma were found in thyrotoxicosis and values below 0·1% were found in non-toxic goitre, treated thyrotoxicosis, anxiety states and the normal state. This method then seems to be the most useful of those investigated for the screening of patients, particularly out-patients, and it is simple to carry out.

ARTIFICIAL PNEUMOTHORAX.

When artificial pneumothorax is used in the treatment of pulmonary tuberculosis it is done in order to relieve tension and to rest the lungs in the hope that the spread of the disease will be prevented and a natural cure produced. Medical practitioners realize that tuberculosis is a systemic disease and that artificial pneumothorax must not be used indiscriminately, but with a full knowledge of the indications for its use and of its limitations. Whenever a new method of treatment is added to the physician's armamentarium, he has to determine its place in the general scheme of treatment, and his ideas on the place occupied by older methods have sometimes to be confirmed or revised. In these circumstances it is of interest to draw attention to a survey of 50 cases in which artificial pneumothorax was used. The report comes from Frank Stadding, Howard Nicholls, and Clifford Hoyle, who write from the Brompton Hospital, London.[1]

The series comprises patients whose treatment began at the Brompton Hospital under the care of one of the authors, and was continued there at his clinic. It includes only those whose plan of treatment the authors had decided and had conducted throughout. No controls are included because the authors were not primarily concerned with a comparison of pneumothorax with other forms of treatment. The aim of the authors has been to describe the events in a personal series.

In the present series pleural adhesions were divided at an early stage of treatment whenever possible. Fifty-four pneumothoraces (four were bilateral) were induced between 1935 and 1944, and the patients were observed until 1949, that is, for periods of five to fifteen years. Eighteen pneumothoraces were carried out for active infiltration and 36 for infiltration with cavitation. Severe toxæmia, pneumonic disease, predominant fibrosis, atelectasis, and a very large cavity were all regarded as contra-indications to this form of treatment. Atelectasis of a lung or a lobe was a common complication; it occurred chiefly after thoracoscopic division of adhesions, and with two exceptions, it was unimportant. Pleural effusion was the main complication. Small effusions were benign, although in four of fifteen cases some obliteration of the pleural space occurred. Large effusions were equally common, were often persistent, and in eight of fifteen cases occurred after the division of extensive adhesions. Tuberculous empyema and premature loss of the pneumothorax were the chief risks. A pneumothorax was regarded as "complete" when it was free from pleural adhesions; it was "adequate partial" when adhesions were thought not to prevent relaxation of the diseased area, and it was "inadequate partial" when adhesions interfered with relaxation of the diseased area. Seventeen patients with pulmonary cavitation had pneumothoraces of the first two types, and in all of them the cavities closed. Twenty others with cavitation had pneumothoraces of the third type; in 14 of these cases the cavities closed, and the closure in three cases was aided by phrenic nerve paralysis. Nine of the 54 pneumothoraces were abandoned for various reasons or were obliterated within three years. Only one of the patients concerned remained well without further treatment. Undesired obliteration occurred in seven other cases after more than three years; five of the patients remained well. Twenty-six pneumothoraces were deliberately abandoned after an average duration of 5·3 years; 22 of the patients remained well. Twelve patients still have pneumothoraces of more than five years' duration; all have quiescent disease in the treated lung. Thirty-eight of the original 50 patients are well and at work. Of the remainder, six have died from their disease, one has died from an unrelated illness, and five are in a state of relapse.

The authors state that their experience during the fifteen years favours the use of artificial pneumothorax. They think that the conditions favouring success have been the recognition of certain contraindications, early division of pleural adhesions, and the maintenance of those pneumothoraces only which were complete or had adhesions remote from the diseased area or were limited to the superior mediastinum. They also attach importance to the minimum duration of three years, and preferably of five years, after the treatment of an initial cavitation. They state that less tangible, but equally important, is a single control policy throughout treatment; most critics will agree with this statement.

[1] *The Quarterly Journal of Medicine*, October, 1951.

PSYCHOSOMATIC SYMPTOMS.

How much of the claims of psychosomatic authorities rest on a solid foundation of fact and how much is simply the result of a missionary zeal associated with the development of a new faith? There is even disagreement on whether to speak of psychosomatic illness, psychosomatic states, psychosomatic personality types, or simply psychosomatic symptoms. Ida Macalpine,[1] of Saint Bartholomew's, Hospital, considers all claims that there are definite psychosomatic personality types as premature and speculative, the immediate task being the study of the mechanism of psychosomatic symptom formation. Her study is mainly based on patients with diseases of the skin, but the same general principles hold true whatever the particular disease entity. It is important to distinguish between psychoneurotic manifestations and psychosomatic symptoms; indeed, the latter have much more in common with some aspects of pre-psychotic and psychotic behaviour than with psychoneuroses. Hysterical (psychoneurotic) symptom formation is defined by Freud as a symbolic expression of a repressed (unconscious) conflict arising in the Œdipus phase, being primarily based on castration anxieties. Such symptom formation may respond to the classical psychoanalytical technique in which old anxiety situations are reactivated by provoking a regression to infantile levels in order to bring into consciousness repressed traumatic memories and phantasies. However, Freud already recognized a group of physical symptoms kept separate as "anxiety neuroses", classifying these as "actual neuroses" in sharp contradistinction to the psychoneuroses. These "actual neuroses" or "anxiety equivalents" cannot be reduced by the psychoanalytical technique; its use may in fact lead to psychotic episodes.

Macalpine found that the outbreak of a psychosomatic symptom can and must be traced to a recent reality stimulus, and the emotion thereby stirred must be discovered. A precipitating or "trigger" factor is frequently found to be a "cover cause", and the operation of unconscious mechanisms has thus to be taken into account. Such "cover causes" are frequently found in references to time and temperature by the patient. But the patient is

[1] *The Lancet*, February 9, 1952.

unaware not only of the significance of the reality stimulus, when this has been traced, but also of the emotion that he is somatically displaying by his symptom. Very often the patient will stress a purely somatic origin, denying even the possibility of psychological causes. Such conscious negation frequently amounts to an unconscious affirmation, and may then be exploited to achieve quick therapeutic results. Any therapeutic gain in this direction is consolidated when the patient fully understands the mechanism by which his symptom has been produced, thus avoiding recurrences. Such understanding is further enhanced by connecting the immediate cause with unliquidated childhood situations where similar feelings had been aroused.

In contrast to the psychoneurotic patient, any secondary gain is inconspicuous or absent, and therefore successful treatment in some cases is surprisingly short. A psychosomatic symptom is thus "abortive behaviour", being a rudimentary, disfigured and only partially expressed emotion, somatically displayed without awareness of its significance. The therapeutic need of these patients is the experiencing of the underlying emotion thus leading to a display of its physical signs. The underlying anxiety is the "inner experience of catastrophe", and this lack of emotional expression, which is normally a physiological function, becomes the starting-point of the symptom. It develops from that common ground where psyche and soma are one, its study belonging as much to psychology as to physiology. Macalpine reserves the term "psychosomatic' for symptoms so characterized.

HUMAN BITE INFECTIONS.

MOST of the injuries classed in the literature as human bites occur on the dorsum of the hand and result from forceful and unfriendly contact between the patient's closed fist and the teeth of a fellow human. The effects are often serious and troublesome. In 1930 M. L. Mason and S. L. Koch[1] published the results of an extensive investigation into the clinical and anatomical aspects of human bite infections of the hand with particular reference to the routes of extension of infection from the dorsum of the hand based on injection experiments on the cadaver. They sum up their findings by stating that bite infections are frequently prolonged in their course and difficult to clear up because of the fact that the infection is usually introduced deeply into the tissues through a comparatively small wound, because of the anatomical arrangement of the structures involved, and because of the relatively low resistance of fascia, bone and tendon to a mixed infection such as is caused by the organisms present in the mouth. Such infections when introduced into the tissues of the dorsum of the hand tend to spread to definite areas, and this extension depends particularly upon the exact site and depth of the primary inoculation and upon the ease or difficulty with which the infectious material can escape to the surface. In the treatment of such infections, Mason and Koch continue, an exact knowledge of the sites to which infection tends to spread is important. These are, in order of frequency, the subcutaneous space of the dorsum of the hand, the subfascial space of the dorsum of the proximal phalanx, the subaponeurotic spaces of hands and fingers which lie directly over metacarpal bones and proximal phalanges, the metacarpo-phalangeal joint, the fascial spaces of the palm and the flexor tendon sheaths. If these sites are kept in mind, extension of infection can be recognized early and accumulations of pus drained before extensive necrosis of tissue has taken place. Unless such infections are drained early and adequately, bone, joint and tendon involvement is certain to occur and to lead to extensive impairment of function.

Mason and Koch's work belongs, of course, to the pre-antibiotic era. Modern developments, particularly the introduction of specific antibacterial therapy, have modified the picture and eliminated many of the crippling effects that have in the past followed human bites, especially those on the hand. The highest point of effectiveness so far appears to have been reached by bacitracin, with which excellent results were obtained in four cases of human bite reported by I. A. Levin and A. B. Longacre.[2] These four cases belong to a series of 27 collected at the Charity Hospital of Louisiana during a period of one year in 1948-1949. Levin and Longacre refer to two other series of human bites reported from the same hospital by F. F. Boyce; one series (90 cases) belonged to the period 1921-1941 and the other (93 cases) to the period 1941-1948. In the first series a few patients received sulphonamides, but most were treated before the advent of modern antibacterial drugs. Compared with that in the second series and in Levin and Longacre's series, the morbidity was high; the stay in hospital was more prolonged, the incidence of surgical drainage higher, and the incidence of surgical complications much higher. Complete amputation of digits was required in 21 cases, partial amputation of digits in three and osteotomy in three; one arm was amputated, and one patient died of pneumonia. In Boyce's second series all patients received at least one of the antibacterial drugs—penicillin, sulphadiazine, streptomycin—or combinations of these. Treatment was otherwise similar in the two series. In the second group no deaths occurred, a mutilating operation was needed in only three cases, and in many instances the inflammatory reaction subsided without surgical intervention. In all their 27 cases Levin and Longacre used a sulphonamide or one of the antibiotics—penicillin combined with sulphadiazine in 12 cases, bacitracin in four, and various combinations in the others. The results were good. The average period of stay in hospital was about five days. Temperatures returned to normal within four days after treatment began. A major complication, osteomyelitis, occurred in one case only. In three cases there was residual limitation of motion in the involved fingers. The results were particularly satisfactory in the four cases in which bacitracin was used. In view of the variety of organisms likely to be introduced from the mouth, it seems reasonable to regard the effectiveness of bacitracin as resulting from its particularly wide antibacterial "spectrum". In the four cases reported by Levin and Longacre, no toxic reactions from bacitracin were observed, and we may well agree with them that it is the antibiotic of choice for the treatment of human bites, especially in fulminating cases, which can end disastrously. For milder infections penicillin should often suffice.

[1] *Surgery, Gynecology and Obstetrics*, November, 1930.

A BLOOD PRESSURE FALLACY.

IT is generally agreed that too much attention should not be paid to absolute blood pressure readings. Nevertheless in certain types of qualifying medical examinations there are occasions when definite limits are set on the readings, and then an important consideration must be faced—the possibility of variation in the respective readings in the two arms. M. J. Rueger[3] points out that although the possibility is generally known, very little has been written on the subject. In practice the possibility is often ignored. Rueger analysed 1388 blood pressure readings taken on each arm of 755 consecutive patients, paying particular attention to the question of acceptance or rejection, according to the arm used, in certain life insurance, employment and service examinations. He found that, according to the arm used, the respective readings would have meant acceptance or rejection for insurance in 165 cases and for military service and industrial employment in 139 cases. This shows one fallacy in the adoption of absolute standards and the value at the first examination of any individual of recording the blood pressure in both arms.

[2] *The Journal of the American Medical Association*, October 27, 1951.

[3] *Annals of Internal Medicine*, November, 1951.

Abstracts from Medical Literature.

PATHOLOGY.

Intimal Vascularization and Atherosclerosis.

Erich Geiringer (*The Journal of Pathology and Bacteriology*, April, 1951) states that the study of 300 human aortas and of 100 coronary arteries leads to the following conclusions. The normal arterial intima is an avascular structure. It acquires a secondary blood supply if it grows beyond a certain critical thickness. This critical thickness, which varies with each artery, is about 0·5 millimetre in the aorta and 0·35 millimetre in the proximal part of the anterior descending branch of the left coronary artery. Intimal vascularization occurs either through an extension of the adventitial plexus into and through the media or by retention of the vascular network of organizing mural thrombi. When both processes occur in the same vessel, anastomoses usually form. This adventitious blood supply of the intima is liable to interference, and most of the clinical effects of atherosclerosis can be traced to the resulting ischæmic necrosis of the intima. These phenomena can be appreciated and studied in uninjected routine sections.

Œdema and Capillary Anoxia.

R. C. Nairn (*The Journal of Pathology and Bacteriology*, April, 1951) states that in order to obtain direct evidence of the effects of local anoxia on capillary permeability and the production of œdema, experiments were performed under controlled conditions on dogs in which the femoral artery of one hind limb was perfused with venous blood from the femoral vein of the opposite hind limb. The average oxygen saturation of the perfusing blood was in the region of 50%, and the duration of the perfusion was usually six to seven hours. In one group of experiments uncomplicated perfusions were carried out; œdema did not develop in the anoxic perfused limb. In a second group of experiments various modifications of the simple perfusion technique were made, and these confirmed the validity of this method of investigating œdema. In the remaining experiments, the perfusion method was used in dogs in which œdema had been produced by saline infusion, plasmapheresis, venous congestion or local injection; anoxia did not aggravate the œdema in the perfused limb nor reduce its rate of reabsorption. The evidence from these experiments and from a critical analysis of the literature suggests that capillary anoxia plays no part in the production of œdema.

Cortisone and Periarteritis Nodosa.

A. H. Baggenstoss, R. M. Schick and H. F. Polley (*The American Journal of Pathology*, July-August, 1951) state that in two cases of *periarteritis nodosa* cortisone acetate was administered. In the first case the patient was under observation for seventy-five days and received 3·62 grammes of cortisone; in the second case the patient was under observation for one hundred and forty-six days and received 13·72 grammes of the substance. Both patients were critically ill when treatment was begun. Despite initial improvement, both patients died of cardiac and renal failure. Histologically, the most remarkable finding was the apparently complete healing of all arterial lesions. All histological signs of inflammation had disappeared in the first case within three weeks and in the second case within three months after biopsy had disclosed acute arteritis. Histological examination of multiple sections from all organs failed to reveal a single vessel which was the site of active inflammation. In the process of healing, however, fibrous obliteration of the lumina of these vessels occurred and resulted in infarcts, which were particularly numerous in the kidneys, heart and intestinal tract. The healed arterial lesions were characterized by severe intimal fibrosis, by focal defects and sometimes complete destruction of the elastic lamellæ, and by fibrosis of the media, adventitia and perivascular tissue. Vascularization of the intima and phagocytes containing hæmosiderin were frequently observed. In the second case the histological findings were similar, except that aneurysm formation, thrombosis and hæmorrhage were more common. In both cases, histological examination of the suprarenal cortex revealed a moderate degree of atrophy and a decrease in lipoid content. Although the histological appearance of the healed lesions in these cases differed in no ascertainable manner from the appearance of lesions observed in cases in which spontaneous healing has been described, it is considered significant that the healing in these cases occurred more quickly than has ever been reported previously.

The Pathology and Treatment of Adenocarcinoma of the Cervix.

S. B. Gusberg and J. A. Corscaden (*Cancer*, September, 1951) state that the study of adenocarcinoma of the cervix has revealed a lesion whose microscopic pattern is variable, in many instances without characteristics that make it distinctive. One cannot differentiate this tumour from a primary corpus lesion on histological grounds in all cases, although certain types with characteristic cervical-gland epithelium and derivations thereof can be distinguished. Some of the biological characteristics of this tumour suggest that it differs in some respects from squamous-cell carcinoma. Its growth properties, however, seem identical with those of squamous-cell carcinoma, as does its mode of extension. This pathway of extension through cervical channels is also taken by corpus cancer when it has invaded the cervix. No significant difference in radiosensitivity could be found between the cervical adenocarcinoma and the more common squamous-cell carcinoma.

Inflammation and Repair of the Glomerulus.

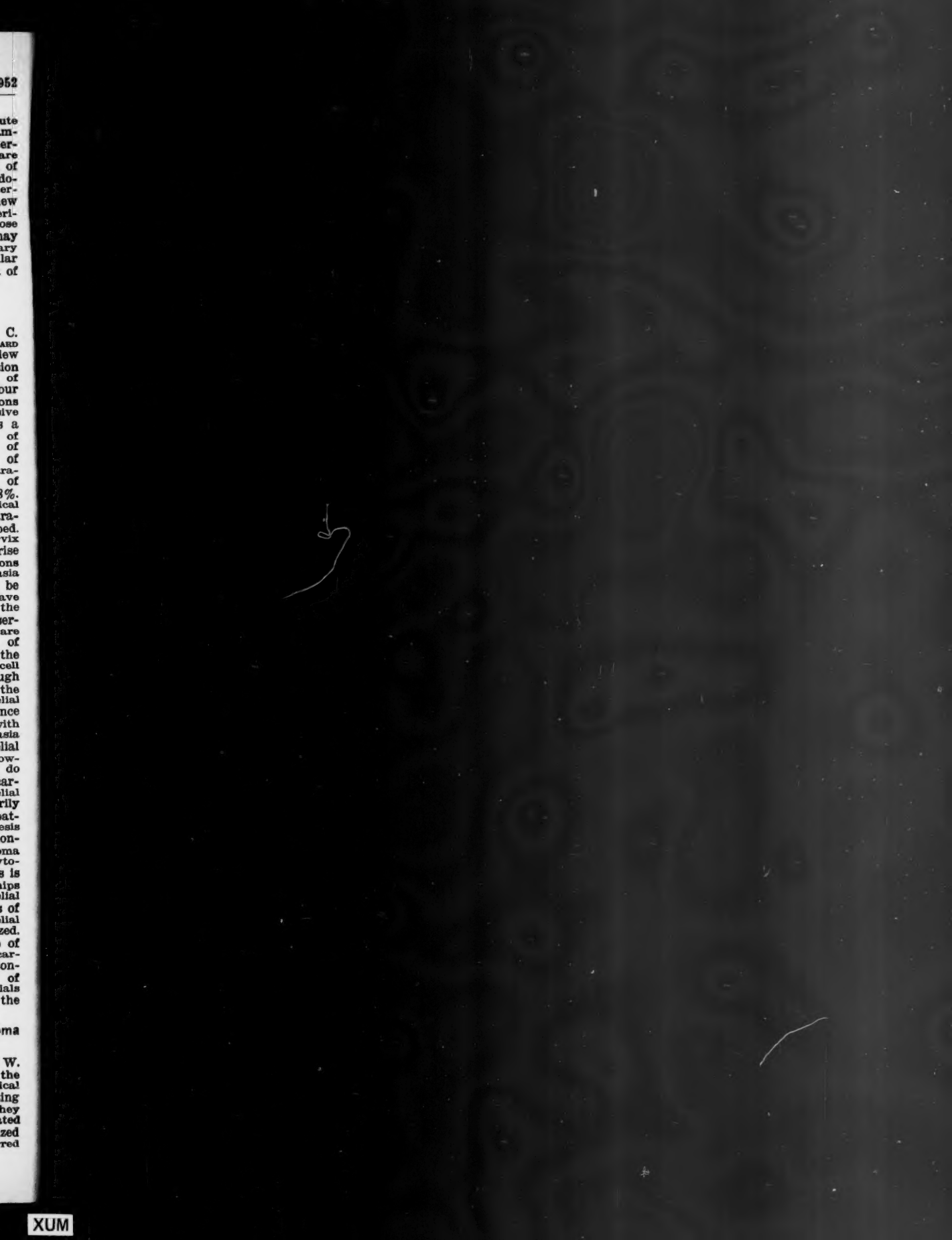
David B. Jones (*The American Journal of Pathology*, November-December, 1951) states that distinct epithelial and endothelial basement membranes are present in the glomerular tuft. An interstitial space is present between these basement membranes and it is continuous with the interstitial space of the connective tissue stalk of the glomerular lobules. In the interstitial space of the stalk there are normally a substantial number of "interstitial" cells which increase with age and with injury. In acute inflammation of the glomerulus, inflammatory cells and proliferated interstitial cells in the interstitial space are the major factors in the production of hypercellularity, rather than pure endothelial proliferation. Proliferated interstitial cells in healing produce new connective tissue fibres in the pericapillary interstitial spaces and in those of the stalk, and this eventually may result in obliteration of the capillary bed of the glomerulus. The glomerular lesion of eclampsia is primarily that of œdema in the interstitial spaces.

Endocervical Metaplasia and Intraepithelial Carcinoma.

Lee Howard, junior, Cyrus C. Erickson and Leland D. Stoddard (*Cancer*, November, 1951) review various interpretations of the lesion known as intraepithelial carcinoma of the cervix. An investigation of four hundred cervices removed for reasons other than pre-invasive or invasive carcinoma has been carried out as a preliminary study. The incidence of inflammation was found to be 98%, of endocervical metaplasia 83%, of nabothian cysts 75%, and of intraepithelial carcinoma 3·5%; that of metaplasia with atypicalities was 1·8%. The morphological and cytological aspects of metaplasia and intraepithelial carcinoma are described. Intraepithelial carcinoma of the cervix is demonstrated in this study to arise in the endocervix. The observations indicate the histogenesis of metaplasia and intraepithelial carcinoma to be similar, in that both appear to have their origin in the reserve cells of the endocervical epithelium. These observations have suggested that there are progressive stages of development of atypical epithelial change from the earliest incipient lesion of reserve-cell hyperplasia to metaplasia and through metaplasia with atypicalities to the fully developed lesion of intraepithelial carcinoma. Comparison of the incidence of endocervical metaplasia (83%) with the combined incidence of metaplasia with atypicalities and intraepithelial carcinoma (5·3%) demonstrates, however, that most cases of metaplasia do not progress to intraepithelial carcinoma. Nor do all intraepithelial carcinomata of the cervix necessarily develop through this histogenetic pattern. Other mechanisms of histogenesis exist. The frequent failure to demonstrate existent intraepithelial carcinoma in a single sample is indicated. Cytological smear diagnosis in this series is discussed briefly. The relationships between pregnancy and intraepithelial carcinoma and between other lesions of the genital organs and intraepithelial carcinoma have been summarized. Statistical analysis of the incidence of intraepithelial and of invasive carcinoma could offer no reliable conclusions about the frequency of invasive change because the materials used were not random samples of the general female population.

Metastasizing Basal-Cell Epithelioma of the Skin.

Raffaele Lattes and Richard W. Kessler (*Cancer*, July, 1951) report the clinical history and the pathological findings in two cases of metastasizing basal-cell epitheliomata of the skin. They state that the first growth originated in the region of the wrist, metastasized to the axillary lymph nodes, recurred



locally after a wide excision and then in the upper part of the arm after amputation, and finally caused distant metastases and death, after a course of about twenty-two years. The second growth started in the scalp, metastasized to the upper cervical and supraclavicular lymph nodes, extended from here into the brachial plexus, and eventually brought about clinical and radiological symptoms of pulmonary metastases. This patient died approximately twelve years after the first appearance of the lesion. Microscopically, the first case exhibited several atypical features but no evidence of its being of squamous-cell nature. The second case was histologically a classical example of basal-cell epithelioma with "adenocystic" features. These two cases, together with eighteen other well-documented similar instances found in the literature of the last fifty-six years, confirm the view that skin epitheliomata of the basal-cell type can exceptionally give rise to regional and distant metastases.

MORPHOLOGY.

Ocular Sympathetic Pathways.

J. S. B. LINDSAY (*Journal of Comparative Neurology*, June, 1951) reports that in addition to the post-ganglionic ocular sympathetic fibres which run in the internal carotid plexus, some of these fibres reach the orbit via the tympanic cavity, having developed embryologically in association with the stapedial artery.

Parieto-Temporo-Preoccipital Cortex.

J. S. BLUM *et alii* (*Journal of Comparative Neurology*, August, 1950) state that they have performed extensive cortical ablations in the parieto-temporo-preoccipital region in four monkeys (*Macaca mulatta*); the temporal lobe was excised in a fifth monkey and the parietal lobe in a sixth. Tests and observations were made both pre-operatively and post-operatively of sensory perception in vision, somæsthesis, audition and gustation, of ability to respond differentially according to context, and of activity and temperament. The parieto-temporo-preoccipital ablations were consistently followed by changes of behaviour only in visual discriminative learning, in patterned string problems, in a conditional reaction, and possibly in taste preference. Other deficits, not shown by all animals, were present in visual acuity and extent of the visual field, object recognition, tactokinæsthetic abilities, auditory localization, and delayed reaction. In three of these animals there was post-operative transfer of somæsthetic discriminative reactions from the trained to the untrained hand, yet subsequently inferior performance with the pre-operatively trained hand. No change was found in any animal in an auditory association problem, in food selection, or in general activity. The animal that underwent temporal lobectomy showed deficit in visual discriminative learning, patterned string problems, conditional reaction, and delayed reaction, as well as changes in taste preference, in food selection, and in tractability. There was also lack of retention of a roughness discrimination. No change appeared in visual acuity and extent of visual field, in object recognition (except transiently), in other somato-sensory tests, or in general activity. The animal that underwent parietal lobectomy showed deficit in roughness and weight discriminations, but none in tactile size and form discriminations, or in visual discriminations. Other tests were not made. After completion of tests, the animals were sacrificed and the cortex and thalamus reconstructed from serial sections. The authors analyse the test results with reference to the locus and extent of cortical lesion and thalamic degeneration. They state that interruption of relay thalamo-cortical circuits is not essential to the production of deficits in visual and somæsthetic discriminative learning, in conditional reaction, or in delayed reaction, and that deficits in visual discriminative learning, in conditional reaction, and in delayed reaction can be produced with minimal damage to "associative" thalamo-cortical systems. In somæsthetic discriminative learning, the importance of such systems is questionable. Thus, the observed deficits cannot be ascribed to primary sensory impairment. Analysis of the test results further shows that these defects resulted neither from general deterioration nor from losses of specific engrammata. On the basis of the results, it is proposed that the parieto-temporo-preoccipital region, exclusive of sensory projection areas, contains separate foci, concerned with facilitating discriminative learning in vision and somæsthesis, and also with acquisition of more complex habits; within this sector, it appears probable that there are also common neuronal pools which are capable of participation in a variety of functions.

Plantar Calcaneo-Navicular Ligament.

R. H. HARDY (*The Journal of Anatomy*, April, 1951) reports observations on the structure and physical properties of the plantar calcaneo-navicular ("spring") ligament in man. It is concluded from X-ray evidence that there is an apparent descent of the head of the talus in relation to the rest of the foot, which is not associated with any significant increase in the distance between the bony attachments of the plantar calcaneo-navicular ligament. The head of the talus descends towards a given baseline, under the influence of "passive eversion" of the foot, by an amount which is equivalent to approximately 17% of the total distance measured, a statistically highly significant difference. The distance between the bony attachments of the "spring ligament" shows an increased separation in the same position of 2·5%, which is not significant. Although this evidence is not sufficient in itself, it is borne out by the histological evidence. If a purely collagenous ligament is subjected to longitudinal loading it is found that it breaks before it stretches; the *ligamentum flavum*, on the other hand, which is largely composed of elastic tissue, will stretch under load to aproximately 140% of its unstretched length, and then regain the original length when the load is removed. Histologically the plantar calcaneo-navicular ligament belongs to the former class. It therefore appears likely that this ligament does not possess elastic properties. It is, however, observed that as the head of the talus descends, the apparent long axis of the navicular itself (that is, the length of its shadow) increases by approximately 10% of its total length. This apparent change in length is presumed to represent a rotation of the navicular about its short (interarticular) axis. It is suggested that this rotation is concerned in a movement of the anterior attachment of the plantar calcaneo-navicular ligament laterally and downwards, which allows descent of the head of the talus in the circumstances described.

The Aortic Arch Derivatives in the Human Adult.

A. BARRY (*The Anatomical Record*, October, 1951) states that most presentations of both the normal and abnormal development of the great vessels leaving the heart are still based on the summarizing diagram of Rathke (1858), or some modification of it. This diagram presents succinctly the various components of the aortic arch system, showing in diagrammatic form their original symmetrical pattern, and indicating which components persist and which have ceased to be recognizable in the adult. The chief inadequacy of this type of diagram is that it cannot, by its very nature, show the adult configuration of the great vessels leaving the heart, nor can it show the relatively tremendous alterations in proportion and relationship that have occurred during development. In addition to these inherent difficulties, the Rathke type of diagram leaves many students confused, because it bears a superficial resemblance to the pattern of the arching aorta of the adult. This may account for the confusing half-truths one occasionally encounters. The caudal migration of the heart and the differential growth of its associated vessels tend to make it difficult to analyse their adult configuration in terms of embryological derivation. A series of diagrams is presented to show the positions of the various recognizable components of the embryonic aortic arch system as they have come to lie in the adult. A few abnormal configurations have been analysed for comparison with the normal. The author hopes that these diagrams, keyed as they are to segmental levels, will aid in describing anomalies of the arch of the aorta and its main branches in terms of their probable developmental origin.

Extensor Apparatus of the Finger.

R. W. HAINES (*Journal of Anatomy*, July, 1951) records investigations into the structure and movements of the extensor apparatus of the finger. A pair of link ligaments attached proximally to the sides of the proximal phalanx and distally to the extensor aponeurosis is described. These ligaments limit flexion in the distal joints of the finger when the middle joint is extended. This linked motion combines with the volar shift of the side slips of the dorsal aponeurosis and with the ligamentous action of the interossei to give smooth combined movements of the digits. Some details of the extensor assembly are reviewed, particularly the insertions of the interossei, the hood ligaments and their attachments to the palmar pads, and the insertion of some fibres of the interossei and lumbricals on the middle phalanx.

Special Articles for the Clinician.

(Contributed by Request.)

XVII.

DYSMENORRHŒA.

Dysmenorrhœa may be primary (essential, intrinsic, idiopathic) when there is no gross pathological condition of the pelvic organs, or secondary (acquired, extrinsic) when it is the presumed consequence of some intrapelvic lesion. A distinction is also sometimes made between uterine and ovarian dysmenorrhœa.

Primary Dysmenorrhœa.

There should be little place, in an article such as this, for discussion at the theoretical level on ætiological factors in dysmenorrhœa. Yet the fact must be faced; the precise cause of primary dysmenorrhœa is not known, and consequently a limited excursion into the supposed predisposing and exciting causes is necessary before the subject of treatment can be approached with any semblance of logic.

Predisposing factors, not necessarily considered in order of importance, include the following.

Psychological Factors.

It is almost impossible accurately to assess the real significance of psychological factors in predisposing a patient towards or aggravating painful menstruation, but it is clear that psychotherapy alone is rarely effective in the treatment of primary dysmenorrhœa. However, it seems worth while to stop for a moment to identify the psychologically unprepared and emotionally tense adolescent who develops painful menstruation as part of a mild anxiety state. But while ignorance and fear concerning the true meaning of menstruation or repugnance may be predisposing factors to painful menstruation in some subjects, unnecessary fussing and solicitude by the mother with constant inquiry as to the presence of pain may be equally productive of primary dysmenorrhœa.

Prolonged states of emotional tension in older girls and young married women also undoubtedly predispose them to painful menstruation, but if the pain is of recent origin it is almost certainly not true primary dysmenorrhœa.

A Lowered Threshold for Pain.

It is well known that noxious stimuli of the same strength produce an increasing sense of pain when constantly repeated; that is to say, the threshold to pain is reduced. It is possible that such conditioning is a significant factor at work in some cases of primary dysmenorrhœa. A fact which is readily appreciated in this connexion is that different subjects react in different ways, so that the same pain (if pain can be measured at all) at least appears to be felt with different intensities. The personality structure therefore must be regarded as of ætiological significance, and the question must be asked: "What kind of a person is this who suffers in this way?" A lowered pain threshold may also be encountered in anæmic and asthenic young women, and attention to their general health may suffice to relieve the coincident dysmenorrhœa.

Endocrine Factors.

We are on rather uncertain ground when we consider endocrine factors; dysmenorrhœa, of course, is a characteristic feature of the syndrome known as primary hypogonadism, and possible predisposing factors to dysmenorrhœa may include the asthenia and low pain threshold of the primary hypogonadal patient, the tendency to anæmia consequent upon her capricious appetite, and possibly (a point to be discussed later) the acutely anteflexed, hypoplastic uterus.

That the level of activity of both œstrogens and progesterone tends to be deficient under these circumstances is borne out by the fact that a close study of the premenstrual endometrium obtained from hypogonadal patients suffering from primary dysmenorrhœa reveals a deficiency of *corpus luteum* activity in the majority of instances. Evidence of a low level of œstrogenic activity is, of course, present in the excessive growth of the long bones, the poor breast development and other physical attributes characteristic of this type.

However, with reference to endocrine factors in primary dysmenorrhœa generally and in contrast to hypogonadism, hyperactivity of the *corpus luteum* with excess production of both œstrogen and progesterone may occasionally be encountered; this may cause an exaggerated development of the premenstrual endometrium, which may be too thick to be completely disintegrated at the actual time of menstruation. Instead, endometrial fragments form and act as foreign bodies, thus stimulating reflexly a hypersensitive uterus to colicky contractions—the so-called "membranous dysmenorrhœa". However, the hypersensitive uterus is the essential factor in the production of pain in these instances, since decidual casts arising from an ectopic gestation are structurally similar but are usually expelled without severe pain.

Uterine Hypoplasia.

The first point to be noted in connexion with uterine hypoplasia is that many dysmenorrhœic women have no uterine hypoplasia, and conversely that most women with uterine hypoplasia have no dysmenorrhœa, especially if other secondary sex characteristics are well developed. There seems to be little evidence to support the view that dysmenorrhœa is caused by poor development of the uterine muscle and that œstrogens relieve the pain by inducing further growth of the muscle.

Acute Anteflexion.

A condition of acute anteflexion, less often retroflexion, of the uterus often accompanies uterine hypoplasia and represents a persistence of the pre-pubertal position of that organ. The role of such malpositions in the ætiology of dysmenorrhœa is open to doubt; whilst there is no actual obstruction of the cervical canal, it is reasonable to assume that such flexion may add to the difficulty of passing macroscopic fragments of tissue or small clots. On the other hand, abnormal flexion of the uterus is often noted in nulliparous women who present no dysmenorrhœa. It seems reasonable therefore to assume that the condition can be accepted as a predisposing factor to painful menstruation, but nothing more.

Postural Defects.

Although the observation that primary dysmenorrhœa occurs more frequently in women with faulty posture than in those without such a defect was first noted twenty years ago, this does not necessarily imply a cause and effect relationship. Primary dysmenorrhœa occurs on the whole more frequently in asthenic women who are particularly liable to postural defects and whose threshold for pain is low, and the relief of pain following the use of corrective postural exercises may reasonably be attributed to a general improvement in health and an increase in the threshold for pain.

Pathology of Primary Dysmenorrhœa.

Although the absence of any gross pelvic abnormality is essential for the diagnosis of true primary dysmenorrhœa, there are two pathological conditions to which reference must be made. Davis (1938) produced evidence which appeared to support the view that in many cases of severe primary dysmenorrhœa the peripheral sympathetic nerve supply to the uterus, especially the presacral nerve, was the site of subacute or chronic neuritis, with widespread degeneration of ganglion cells and interstitial inflammatory infiltration. In this view the pain of primary dysmenorrhœa may be due to an exaggeration of either motor or sensory impulses by a nerve rendered hypersensitive through inflammation.

The other pathological condition which is compatible with a diagnosis of primary dysmenorrhœa is sclerocystic disease of the ovaries occurring in the absence of any other pathological changes in either the uterus or the adnexæ. However, such ovaries are often present in women without dysmenorrhœa.

Exciting Causes of Primary Dysmenorrhœa.

In contrast to the many possible predisposing factors to primary dysmenorrhœa, there are probably only one or two conditions constituting the fundamental basis for the pain. These are (*a*) ischæmia of uterine muscle and (*b*) a pathological hypersensitivity of the nerve endings in the isthmus of the uterus.

The presence of highly specialized sensory nerve corpuscles in the endometrium at the level of the internal os has been demonstrated by Keiffer (1933). Clinical confirmation of this fact is stated to have been provided by the observation that, in women subject to primary dysmenorrhœa, the passage of

a uterine sound evokes an attack of pain almost identical with that experienced during menstruation. This viewpoint places the ultimate ætiology of primary dysmenorrhœa in the category of constitutional disorders or instability of the autonomic nervous system comparable to the "spastic colon" and to bronchial asthma—conditions which may, in fact, coexist with the dysmenorrhœa, and in which psychogenic factors play a comparably major predisposing role.

It has further been shown by Moir (1933) that the normal rhythmic uterine contractions become stronger just before and during menstruation, and that in patients suffering from primary dysmenorrhœa these contractions are much exaggerated. By means of an intrauterine bag attached to a manometer and a recording drum it was shown that the intrauterine pressure could reach 120 millimetres of mercury without discomfort, but that pain was experienced if the intrauterine tension exceeded the patient's systolic blood pressure. In view of this and other supporting evidence, Moir put forward the view that the pain was the direct result of uterine muscle ischæmia brought about by contractions of exaggerated strength. Although Moir believed that the contractions were exaggerated because of an unnatural sensitivity to progesterone, and Keiffer considered that they were the consequence of pathological sensitivity of nerve endings, they were on common ground in accepting the idea of unnaturally strong contraction as the ultimate cause of the pain.

The Treatment of Primary Dysmenorrhœa.

Preventive Measures.

Preventive measures follow common-sense lines, which have already been indicated to a certain extent. There seems to be little doubt that primary dysmenorrhœa is more frequent in girls who follow a sedentary occupation and whose natural inclinations do not lead them to take regular outdoor exercise, and in those whose upbringing has, for one reason or another, given the girl the wrong "approach" to menstruation. Much can be achieved by reorientation of ideas, by good personal hygiene and by healthy living. Normal physical activities should be continued during the menstrual period as far as possible.

Curative Measures.

Logically, in addition to symptomatic treatment, one should attempt either to remove or to alleviate the constitutional factors which evoke the hypersensitivity of the motor and sensory autonomic nerves supplying the uterus, or surgically intercept the nerve pathways to and from the uterus. The former calls for medical treatment and the latter requires surgical measures.

Medical Treatment.—Medical treatment includes the removal of chronic foci of infection (sinusitis seems particularly common), the provision of a well-balanced, liberal diet with especial attention to its calcium and thiamine content, and sufficient mental and physical rest balanced by a programme of regular non-competitive outdoor exercise. Anæmia must be treated and a change of environment may be helpful. Some degree of nervous tension is often present, and a quiet interview in the absence of the girl's mother will often give the practitioner a chance to break the vicious circle of emotional tension-painful menstruation-greater tension. Palliative treatment includes the administration of the usual range of non-habit-forming analgesic drugs, of which acetylsalicylic acid (five to ten grains) and codeine (half a grain to one grain) are most commonly employed. Sedatives have little value alone, but phenobarbital used in conjunction with analgesics may help to control the "anxiety factor" if one is present, and so raise the threshold for pain.

Antispasmodic drugs naturally have a place in the treatment of primary dysmenorrhœa, because of the almost specific effect of atropine sulphate (one one-hundredth of a grain) when given by injection for this condition. However, since such an injection would have to be repeated two or three times a day—an impracticable procedure for the most part—various attempts have been made to incorporate antispasmodic drugs in powders, capsules, cachets and mixtures. Thus atropine sulphate (one one-hundred-and-fiftieth of a grain) has been included in a useful capsule with acetylsalicylic acid (five grains) and codeine (half a grain); ephedrine hydrochloride (one-eighth of a grain) has been combined with potassium bromide and hyoscyamus powder in a cachet; and tincture of belladonna (ten minims) has been included (with doubtful benefit) in an analgesic mixture. Recently magnesium gluconate was given extensive therapeutic trial for its antispasmodic effect, but without convincing effect. Any palliative preparation not previously used by the patient is likely to give a satisfactory measure of relief for the next two or three months, and caution is needed in assessing its ultimate value.

Insulin stimulates metabolism, and in some unknown way favourably and lastingly influences menstrual function in underweight visceroptotic and dysmenorrhœic young women when given in a daily dose of ten units over a period of three months. Most of the clinical trials of insulin for primary dysmenorrhœa have been carried out in the United States of America, and the need for careful selection of patients for this mode of therapy is stressed.

Finally, hormone therapy may be used in the programme of medical treatment. Œstrogens may conceivably help in the following ways: (*a*) by increasing the vascularity of the uterus and so reducing ischæmia; (*b*) by inducing greater development of a hypoplastic uterus (this effect is doubtful); (*c*) by inhibiting the secretion of the follicle-stimulating anterior pituitary hormone and so preventing ovulation and the formation of a *corpus luteum*, thus eliminating the factor of exaggerated uterine contractions due to progesterone sensitivity.

For this purpose diethystilbœstrol may be used, one milligramme being given by mouth daily for three weeks from the cessation of a menstrual period, or ethinyl-œstradiol, 0·05 milligramme being given by mouth for twenty-four days, commencing twenty-one days before the next menstrual period is due (the overlap is deliberate). A painless œstrogen withdrawal hæmorrhage usually occurs within a few days of the cessation of the œstrogen administration, but the pain almost invariably returns with subsequent untreated cycles. Continuous treatment with œstrogens in dosage sufficient to inhibit the anterior lobe of the pituitary gland is potentially damaging to the normal functioning of that gland. However, the cyclic administration of small doses of œstrogen with appropriate rest periods in dysmenorrhœic and obviously hypogonadal adolescents is both logical and effective when used in conjunction with other measures of a more general nature.

The administration of progesterone, chorionic gonadotropin or testosterone propionate for primary dysmenorrhœa has no logical basis, and the use of any of these preparations is in fact contraindicated.

Surgical Treatment.—All forms of surgical treatment for primary dysmenorrhœa have a common objective—to prevent the transmission of painful nerve impulses from the uterus. The measures which may be employed are, in order of their adaptability to the average patient, as follows: (*a*) prolonged dilatation of the cervix; (*b*) injection of alcohol into the ganglia of the cervical plexus; (*c*) resection of the so-called presacral nerve.

Cervical dilatation was originally employed in the treatment of dysmenorrhœa on the assumption that the pain was caused by an obstruction at the internal os. Although it is by no means permanent, the satisfactory measure of relief afforded by prolonged dilatation of the cervix is more probably the result of pressure atrophy of the over-active sensory corpuscles in the isthmus of the uterus. (The cure of primary dysmenorrhœa by pregnancy and parturition is brought about by this means.) To be effective, dilatation to a number 12 size Hegar's dilator should be attained under anæsthesia. Some gynæcologists follow this with the introduction of a stem pessary into the cervical canal; this is left in position for several days. Others pack the dilated canal with glycerin-soaked gauze.

The injection of alcohol (80%) into Frankenhäuser's plexus causes degeneration of the nerve cells which relay sensations of pain from the uterus or motor impulses to the uterus. However, the technique calls for considerable experience, and the procedure is not without hazard. Good results have been stated by Davis to follow the combination of both procedures, cervical dilatation and alcohol injection.

The third accessible point for the interruption of pain-producing impulses from the uterus is situated in the superior hypogastric sympathetic plexus or presacral nerve as it lies behind the peritoneum in the triangle formed by the bifurcation of the abdominal aorta and the promontory of the sacrum.

The surgical resection of this condensation of sympathetic nerve fibres was devised by Cotte in 1925, and with good selection of patients and expert technique, at least 75% of permanent cures can be attained. The failures are apparently due to incomplete removal of the nerve tissue or to poor pre-operative assessment of the case. Presacral neurectomy is a major operation and should not lightly be undertaken. It is reserved for the most severe and intractable types of primary dysmenorrhœa occurring in a person of stable personality.

XUM

Secondary Dysmenorrhœa.

The term secondary (acquired, extrinsic) dysmenorrhœa is applied to those instances of painful menstruation which are associated with, and, are presumably caused by, the presence of certain gross and often obvious pathological lesions within the pelvis. Such lesions include chronic pelvic inflammatory disease in its various stages and forms, intramural uterine fibroid tumours, pelvic endometriosis and some instances of complicated uterine retroversion. Pain may or may not be present in the intermenstruum, but is chiefly felt at the actual time of the menstrual flow. Secondary dysmenorrhœa, which is the consequence of ovarian rather than of uterine abnormality, tends to be pre-menstrual, the pain being localized to one or both sides of the lower part of the abdomen, in contrast to the diffuse mid-line lower abdominal pain of uterine dysmenorrhœa, and there is no associated bladder irritability.

With chronic inflammatory conditions of the pelvic viscera there may be limitation of uterine mobility, thickening of the parametrium, and adnexal tenderness with or without the presence of a definite mass. Surgical intervention is less often necessary in these days of antibiotics and sulphonamides, but may be indicated in resistant and complicated cases.

Intramural and submucous uterine fibroid tumours may cause no symptoms other than menstrual pain. A hysterogram may be of assistance in diagnosis. On the other hand, multiple fibromyomata may be present without associated menstrual pain.

Pelvic endometriosis is especially productive of dysmenorrhœa, and this may be the only symptom of the condition. When the ectopic endometrial tissue develops in the ovary with the formation of typical "chocolate cysts", or when it is located in the recto-vaginal septum, the diagnosis is usually clear. However, when the myometrium is the site of the aberrant endometrium there may be few physical signs, and elucidation of the cause of the persistent dysmenorrhœa may present a problem. Since the condition is likely to occur in comparatively young women who also complain of primary or secondary infertility, the effective relief of dysmenorrhœa from this cause raises many problems which cannot be discussed here. Surgical treatment for ovarian endometriosis tends to be conservative in this age group, and radiation therapy, though useful, is usually regarded as a last resort.

An uncomplicated retroversion of the uterus is rarely a cause of secondary dysmenorrhœa. The association, if any, can easily be put to the test by replacing the uterus in an anteverted position and maintaining it there by the use of a properly fitting Smith-Hodge pessary. Unless there is definite and consistent relief of painful menstruation over several months of pessary treatment, surgical treatment for the retroversion is contraindicated. Dysmenorrhœa may be ætiologically related to a backward displacement of the uterus when the latter is fixed in that position by adhesions, which themselves are often the consequence of other pathological conditions in the pelvis such as chronic inflammatory disease or pelvic endometriosis.

G. Shedden Adam,
Professor of Obstetrics, University of Queensland, Brisbane.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

HOSPITAL STORES.[1]

Colonial Secretary's Office,
Sydney, April 30, 1841.

The Deputy Inspector General of Hospitals.

Sir,

I am directed by the Governor to inform you in reply to your letter of 13th instant, that in compliance with the wish therein expressed, His Excellency, accompanied by myself, visited the South Wing of the General Hospital on Saturday last and went through the whole of the Stores which are under the charge of Mr Croft, the Deputy Purveyor.

His Excellency was sorry to observe a great want of order in these stores as well as much apparent negligence in the arrangement of the medicines and other articles contained in them. In your letter to the Commanding Royal Engineer of the 31st of March last, you state that there are stores in the Building to the value of £50,000. For what purpose so large or so valuable a collection of stores should have been allowed to accumulate the Governor is at a loss to imagine, but he can have no hesitation in saying that if the stores be of this value or even of the fourth part of this value they should be kept in far better order than they appear to be.

With respect to the giving up of a Room for the Dispensary, His Excellency can see no difficulty whatever. By a better arrangement the stores which now occupy four rooms on the lower floor, may easily be put into three, and the lower room at the South end of the Building then given up for the use of the Sydney Dispensary.

The old Dead House would appear to His Excellency a very proper place of deposit for many of the heavy boxes, which now stand in one of the rooms and especially for the Boxes or Crates which contain inflammable acids.

The South end of the verandah may, the Governor conceives, be closed in, and a door opened from it into the room which is to be the dispensary—by which the verandah will form a place of rest for the Patients without exposure to the weather, and the present entrance to the Building kept entirely free from their intrusion.

In order more completely to cut off the Dispensary Patients from the rest of the Building, a palisade may also be put up across the yard from the end of the Building to the nearest boundary walls and a new entrance opened from Macquarie Street.

The Commanding Engineer has been furnished with a copy of this Communication, in order that he may report on the practicability of what is proposed, and I am directed to observe that there appears to be no necessity at all for disturbing the Assistant Surgeon who occupies 2 rooms on the upper floor and that consequently there will be no occasion for incurring the expense contemplated in my letter of 7th instant for lodgings for that officer.

I have, &c.,
E. Deas Thomson.

This letter illustrates one phase of the struggle of the Sydney Dispensary to find premises suitable for the conduct of its activities. At first established (1826) in a cottage in Macquarie street, it had numerous changes of location and found the annual rental an increasing burden. Appeals to the Government for a grant of an allotment of land in addition to the existing pound for pound subsidy were unavailing until the arrival of Sir George Gipps as Governor (1838). He received sympathetically a suggestion that the Dispensary should be given the South Wing of the Convict Hospital, and despite strenuous opposition from the Deputy Inspector General of Hospitals (J. V. Thompson) and the Ordnance Department in London, who wished to utilize the wing as a military hospital, he obtained the approval of the Home Government. Various difficulties were raised, and in spite of the Governor's direction it was not until February, 1842, that the Dispensary gained possession of the lower room and adjacent veranda. Shortly afterwards it acquired also the quarters of the assistant surgeon to whom this letter refers. The transfer of the whole South Wing was also strenuously opposed, but was finally accomplished in March, 1843, and in the same year the Dispensary became the Sydney Infirmary and Dispensary. When the Convict Hospital was closed in 1848, the infirmary took over the Centre Wing, which it had occupied, and vacated the South Wing.

[1] From the original in the Mitchell Library, Sydney.

Research.

THE NORMAN McALISTER GREGG PRIZE AND AWARD.

It might appear strange that in this country (apart from the presentation to him of the Shorney Prize in 1944) no acknowledgement at an appropriate level has been made of Dr. Norman McAlister Gregg's striking and widely acclaimed clinical investigations of some twelve years ago.

However, in July last year, the University of Toronto conferred upon Gregg its Charles Mickle Fellowship which is given each decade to "that member of the medical pro-

fession who is considered to have done most during the preceding ten years to advance sound knowledge of a practical kind in medical art or science". Thus the Fellowship reflects high honour indeed. Subsequent to the award of the Charles Mickle Fellowship the Council of the Ophthalmological Society of New South Wales invited the several medical associations, teaching organizations and hospitals to send representatives to discuss with representatives of the Council suitable ways of extending to Dr. Gregg acknowledgement and appreciation of his scientific achievement. In due course a meeting, constituted in the manner mentioned, was held under the chairmanship of Professor Harold Dew. The meeting resolved itself into a committee, and it was decided that medical practitioners should be invited to join with the committee in tendering to Dr. Gregg a complimentary dinner. During the deliberations of the committee it was announced by Dr. Gregory Flynn, President of the Ophthalmological Society of New South Wales, that the society intended to establish a medical prize fund, to be known as the Norman McAlister Gregg Prize Fund, from the finances of the society and the contributions of ophthalmologists. The committee thereupon resolved that the balance of the moneys available from the subscriptions of medical practitioners to the complimentary dinner, after the discharge of related expenses, should be applied to the striking of a medallion depicting in bas-relief the guest whom it was desired to honour. It was further resolved that the first impression of the medallion, suitably inscribed, should be presented to the guest of honour and, with the concurrence of the Ophthalmological Society of New South Wales, that a further impression of the medallion, to be known as the Gregg Award, should be presented to each winner of the Gregg Prize. The Ophthalmological Society of New South Wales was appointed trustee of the Gregg Award and its funds. Incidentally, the funds appear to be adequate for the reproduction of medallions indefinitely.

On December 7, 1951, the complimentary dinner was held at the Royal Sydney Golf Club, Rose Bay, with Professor Harold Dew in the chair. The choice of venue was a happy one for the guest of honour on account of his former association with the club as captain. The function was attended by 133 medical practitioners who included the leaders of the medical profession in this State and a wide representation of the university, medical institutions and associations.

Professor Lorimer Dods, in proposing the toast of Dr. Norman Gregg, said that he thought that it was Macaulay who once issued a wise warning about the biographers' disease—*pox biographica*—the hazard of over-statement. Professor Dods thought that the present was one of those very rare occasions when this hazard barely existed, for Norman Gregg was one of those people who seemed to have excelled in most things. He said that he was a clumsy, backward boy at school, but Professor Dods found from his friends that he was playing in the Sydney Grammar School First Eleven at fourteen years of age, that he proved to be one of the school's best athletes, and that somehow or other he managed to collect at least two Wigram Allen Scholarships at school and finally achieved a scholarship to the university.

As a very young undergraduate with his scholarship under his arm, Norman Gregg had made a flying start at the university by achieving a blue for tennis before the end of the first week of his first term and by playing cricket with the First Eleven a few weeks later. This was the beginning, and over the next five years a series of university blues for cricket and tennis, a half-blue for baseball, New South Wales State blues for cricket and tennis, and a lively and enthusiastic interest in any party which was going must have interfered in some way with Norman Gregg's work as a medical student, for, although he achieved a long line of distinctions during his course, Professor Dods found that he only just scraped into third place in the final first-class honours list.

After his graduation in March, 1915, there was a period of hesistant indecision which was responsible for a lag of nearly four days before he was on a ship and on his way to England to join the British Expeditionary Force. After more than three and a half years of active service as a regimental medical officer in France where he was gassed, wounded and awarded the Military Cross, Normal Gregg returned to Australia to take up his first appointment as a resident medical officer at the Royal Prince Alfred Hospital where Professor Dods could remember him helping the late R. Gordon Craig to establish the new speciality of urology. A little more than a year later Norman Gregg's interest turned cranialwards and his ophthalmological work began. Professor Dods asked who knew what revolutionary discovery might have been made in the mesonephric field if Norman Gregg had continued to work at the caudal end.

The rest of his story was well known to those present. His outstanding ability as a clinician, his great influence as a teacher and his wide range of interests and activities—university lecturer in ophthalmology, senior ophthalmic surgeon to the Royal Prince Alfred Hospital and to the Royal Alexandra Hospital for Children, a very active vice-president of the Board of Management of the Royal Alexandra Hospital for Children and captain of the Royal Sydney Golf Club. In the midst of all these things and an extremely busy professional life, Norman Gregg had been able to preserve the sense of imagination, the clear thinking and the prepared mind which enabled him when the moment arrived to grasp at a slender clue, to interpret its significance and to prove his case. It was early in 1940 that he recognized the first clue which pointed the way to his final discovery, and less than a year later his brilliant and dramatic incrimination of maternal rubella as a cause of congenital malformations suddenly opened up an entirely new and revolutionary approach to the causation and possible prevention of congenital malformations.

Both before and during the Middle Ages, congenital defects were accepted as evidence of the wrath of heaven or the work of the devil, and Shakespeare spoke of "the foul fiend who gives the web and the pin, squints the eye and makes the hare lip". A century or two later the popular theory that impressions on the pregnant mother's imagination were responsible for the malformation of her infant produced a series of excellent stories.

By the beginning of the nineteenth century the popular maternal impression theories had been discarded and there was a tendency to attribute all congenital malformations to genetically determined defects in the germ plasm. It was now just ten years since Norman Gregg's revolutionary discovery dramatically upset nearly one hundred and fifty years of dogmatic generalizations about germ plasma defects of genetic origin and suddenly opened the eyes of the whole medical world to the possible part played by infections and other "noxious influences" during pregnancy. As those present knew, Norman Gregg's work in this field had received world-wide recognition and appreciation and had brought great honour to Australian medicine in general and to Australian ophthalmology and pædiatrics in particular. Last July they had all been very proud and pleased to learn that the University of Toronto had officially recognized the great significance of his work by awarding to Norman Gregg the Charles Mickle Fellowship which was presented each year to that member of the world's medical profession who had done most during the preceding ten years to advance knowledge of medicine and medical science. Many hoped that this award would mark the beginning of further official recognition of Norman Gregg's work, both at home and abroad.

To most of those present the word "research" suggested the long white coat, the laboratory and the peace and quiet of the cloisters, and yet Gregg's unique piece of research had been achieved in the midst of the stress and turmoil of an extremely busy professional life and stood and would always stand in the history of medicine as an excellent example of outstanding research achieved in the ordinary course of medical practice.

Dr. W. MacDonald, in seconding the toast, said that he had known Norman Gregg for many years and that he had always found him to be a gentleman and true sportsman and a delightful and erudite colleague. He referred to Norman Gregg's achievements in sport and in scholarship. He said that had the First World War not intervened, membership of the Davis Cup team representing Australia had been well within his reach. Instead he had joined the British Army and been decorated with the Military Cross. His attitude to Dr. MacDonald had always been generous and friendly, and for the fifteen years during which they had worked together Dr. MacDonald could recall no "nasty moment" and no feeling of ill-will. Norman Gregg's most outstanding characteristics were his unselfishness and his enthusiasm. No meeting was too distant for him to address, and no gathering too small, provided he knew that his audience was interested. With his great enthusiasm, public spirit and drive, Gregg had been of the greatest help to the medical profession in New South Wales in general and to ophthalmologists in particular. Dr. MacDonald knew of no one who had had such an influence for good or had set a finer example to his colleagues. Had it not been for the original work for which they were honouring him that evening, Dr. MacDonald held that Norman Gregg deserved thanks and appreciation for his services to the profession of medicine.

Professor Harold Dew presented Dr. Gregg with the medallion. Dr. Frank Claffy, Vice-President of the Ophthalmological Society of New South Wales, announced the establishment of the Gregg Prize.

Dr. Gregg, in reply, expressed his wonder and pleasure at the gesture made to him and his appreciation of the presence of so many esteemed colleagues. He graciously acknowledged the help he had received in his work from many collaborators.

The medallion, which is by Mr. J. B. Collis, was produced in bronze and engraved by Messrs. Edgar Kemp and Company, and the photograph, which is reproduced in these columns, is by Dr. A. E. F. Chaffer. On the reverse of the medallion the words "Gregg Award in Medical Science" are inscribed circumferentially, while centrally the following is engraved: "First Impression—Presented to Norman McAlister Gregg by his medical colleagues. 7th December, 1951."

The capital fund of the Gregg Prize, which is provided entirely by ophthalmologists and their corporate associations, totals one thousand pounds, and this has been subscribed in part by ophthalmologists individually, amongst whom were several interstate subscribers, and subsidized substantially by the Ophthalmological Society of New South Wales and very liberally by the Medical Eye Service of New South Wales.

The conditions of the prize have been drawn up by the Council of the Ophthalmological Society of New South Wales. The prize will be offered trienially, probably first in 1955 or 1956, and it is expected that the value of each prize will be in the vicinity of 100 guineas. The rules are set out below. It will be open to British subjects and will be awarded to the candidate whose work is deemed to be the most valuable contribution to knowledge in ophthalmology. It is expected that the definition of ophthalmology will be very wide for these purposes and there are, in fact, more medical subjects which have a bearing on ophthalmology than otherwise. The work of the candidate must be his own and must be written since the prize was last awarded. On each occasion of the holding of the competition the Council may invite works on ophthalmology generally or on a specific subject or subjects.

It has been announced that the Royal College of Obstetricians and Gynæcologists has conferred upon Norman McAlister Gregg its Fellowship and it is expected that further honours will fall upon him.

The Rules of the Norman McAlister Gregg Prize.

The following rules have been adopted by the Council of the Ophthalmological Society of New South Wales pursuant to the resolution of the society dated November 21, 1951, and take effect from February 7, 1952.

1. The prize fund, to be known as the Norman McAlister Gregg Prize Fund, shall be administered by trustees being members of the society, who shall be appointed by the Council which shall have power to remove and replace the trustees from time to time at its discretion.

2. The moneys and investments from time to time comprising the prize fund shall be held by the trustees and paid or applied by them in such manner as the Council may direct.

3. A competition for the prize, to be known as the Norman McAlister Gregg Prize, shall be held by the Council once in every three years or at such intervals as the Council may determine.

4. The value of the prize shall be such as the Council may determine from time to time and the cost thereof and the expenses of administration of the prize shall be borne by the prize fund.

5. Upon the cessation of the scheme for any reason whatsoever, the then unexpended balance of the prize fund shall be applied in such manner as the Council may direct.

6. The conditions regarding the conduct of the competition and the award of the prize shall be such as may be prescribed by the Council from time to time and in particular as follows: (*a*) Subject to these rules the prize shall be awarded to the candidate whose work is deemed to be the most valuable contribution to knowledge in ophthalmology. On each occasion of the holding of the competition the Council may invite works on the above matter generally or on a specific subject or subjects. (*b*) A candidate must be, and declare that he is, a British subject. (*c*) The work to be submitted by a candidate must be in the English language. It must be his own and written since the prize was last awarded. If such work has previously been submitted for publication, details must be supplied by the candidate. (*d*) The Council shall appoint examiners for each competition and the Council's decision as to the winning entry shall be final and conclusive. (*e*) In the event of the Council being of opinion that no work is of sufficient merit it shall not award the prize. The value of any such prize or prizes not awarded from time to time may be expended by the Council either in the purchase of books for the library of the society, such books to be subscribed "Donated by the Norman McAlister Gregg Prize Fund", or in such other manner as the Council may determine.

7. Subject to any resolution of the society to the contrary, the Council may revise these rules from time to time and rescind, amend or extend the same as it may deem necessary or desirable.

Correspondence.

PNEUMOCOCCAL MENINGITIS TREATED WITHOUT INTRATHECAL THERAPY.

Sir: I refer to the case report "Pneumococcal Meningitis Treated Without Intrathecal Therapy" published in The Medical Journal of Australia, March 1, 1952.

One doubts if it is justifiable to recommend an older less efficient method (oral sulphadiazine and intramuscular penicillin) over a modern and better method (intrathecal penicillin) of treatment.

In 1940 I treated my first case of pneumococcal meningitis with sulphapyridine. The patient recovered. But I also remember another case in 1949 who died in spite of intramuscular and intrathecal penicillin and sulphadiazine. The first case was of a few hours' duration and had a thin cerebro-spinal fluid exudate; the second case was of several days' duration and had a sticky cerebro-spinal fluid. My last case of pneumococcal meningitis recovered in a country hospital with intrathecal penicillin; the cerebro-spinal fluid was negative after the initial injection of 20,000 units of penicillin in 10 cubic centimetres of commercial sterile distilled water, and the intrathecal injections were continued daily till three cerebro-spinal fluid specimens were negative on culture.

My own figures for the last five years in general country practice have been, disregarding benign lymphocytic meningitis and mumps meningitis, eight cases of *Hæmophilus influenzæ* meningitis and two cases of pneumococcal meningitis. All, excluding the one case quoted above, recovered without relapse or sequelæ with intrathecal therapy. In all cases of suspected meningitis I have routinely given 20,000 units of penicillin and 0·1 gramme of streptomycin mixed together in 10 cubic centimetres of commercial sterile

water when the cerebro-spinal fluid looked abnormal. Needles and syringes were sterilized by boiling and the skin merely cleansed; after all the antibiotics should provide their own asepsis, and sterilization of the skin is rarely attained by antiseptics. When the organism has been identified the appropriate antibiotic has then been given intrathecally each day until three negative cultures of cerebro-spinal fluid have been obtained.

No complications have ensued from infection or thecal irritation. In the first cases a secondary pleocytosis did occur; but this was before crystalline penicillin G was available. Moreover, in my opinion the pleocytosis can represent a leucocyte lag carried on after clinical recovery.

In one case I injected by mistake 60,000 units of non-crystalline penicillin intrathecally. It was a three-weeks-old baby suffering from influenzal meningitis. That baby is today a normal healthy toddler. All other cases had no after effects several months after discharge from hospital. Their average stay in hospital was two weeks; and discharge could have been earlier but for the fact that they lived in the country many miles away, and one wanted to be sure that there was no relapse before they left hospital.

It would seem unwise to deprive a patient with suspicious looking cerebro-spinal fluid of initial intrathecal therapy, even in remote areas. The risk is negligible. It is a well-tried and proven method. With penicillin and streptomycin combined in the initial injection it will cover the more common hæmophilus infection (in spite of the encouraging reports of intramuscular streptomycin or "Chloromycetin" alone, one still feels happier with a tried and satisfactory method). As regards a pneumococcal infection, the important thing is to destroy the organisms by the quickest and surest method. Then there is less chance of a plastic exudate forming in the cerebro-spinal fluid and having to do cisternal and ventricular punctures to carry on the therapeutic attack to save a life but perhaps leave a damaged brain.

Yours, etc.,

J. DE VIDAS, M.R.A.C.P.

Oakey,
Queensland,
March 24, 1952.

ECONOMY IN THE USE OF X-RAY FILMS.

SIR: There is a world-wide shortage of X-ray films, mostly due to the increasing requests for radiological investigations, and the manufacturers are finding it impossible to keep up with the demand.

Practically all film base comes from "hard" currency areas, and during the period of reduction of imports it is possible that there will be a "cut" in the amount of film base and of X-ray film admitted to Australia.

During this period of restriction it will be necessary to exercise the greatest economy in the use of films. Clinicians can help to achieve this by entering on the X-ray request form a brief clinical history and details of relevant clinical findings, and by being quite specific in their statement of the problem to be solved and the part to be examined.

State departments of public health which are conducting mass X-ray surveys might consider the necessity for limiting them to known vulnerable groups and to densely populated areas before extending into the more sparsely populated regions of their States.

Yours, etc.,

A. J. METCALFE,
Director-General of Health.

Canberra,
March 24, 1952.

THE CONSERVATIVE TREATMENT OF PERFORATED PEPTIC ULCER.

SIR: With reference to the above article by Dr. Cammack in THE MEDICAL JOURNAL OF AUSTRALIA of March 22, 1952, and also an article on this subject in the *British Medical Journal* of recent date, there is one aspect of this subject which has not been mentioned. The advocates of the conservative treatment of perforated peptic ulcer fail to explain how they can be so completely confident in their diagnosis.

As is well known, many cases of perforated peptic ulcer have no history whatever of preceding gastro-duodenal symptoms. In many cases, therefore, it is impossible to tell

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED MARCH 29, 1952.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.[2]	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[3]
Acute Rheumatism	..	..	..	..	..	..	..	..	..
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	..	..	..	..	..	..	..
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	..	..	3(3)	..	..	..	..	..	3
Diphtheria	6(1)	3(3)	4(2)	..	3(3)	..	..	..	16
Dysentery (Bacillary)	..	..	7(5)	..	..	..	..	..	7
Encephalitis	1(1)	..	..	..	..	..	..	..	1
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	..	..	..	..	23(5)	..	..	..	23
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	..	..	..	..	..
Leptospirosis	..	..	1(1)	..	..	..	..	..	1
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	1(1)	3(3)	..	..	..	1(1)	..	..	5
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	11(4)	1(1)	2	..	2	..	..	..	16
Puerperal Fever	..	..	3(3)	..	..	..	..	..	3
Rubella	..	2(1)	..	..	1(1)	..	..	..	3
Salmonella Infection	..	..	..	..	..	..	..	1	1
Scarlet Fever	41(4)	36(10)	4(2)	..	3(3)	6	..	..	90
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	2(1)	..	..	..	..	..	2
Trachoma	..	..	..	..	..	..	..	..	..
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	46(35)	54(47)	12(7)	..	6(2)	7(2)	..	..	125
Typhoid Fever	..	1(1)	1	..	..	..	..	..	2
Typhus (Flea-, Mite- and Tick-borne)	1	..	3(1)	..	1(1)	..	..	..	5
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.
[2] Figures not available.
[3] Figures incomplete owing to absence of returns from South Australia and the Northern Territory.

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whether one is dealing with a perforated appendix or a perforated peptic ulcer when presented with an acute abdominal emergency, and neither time nor the patient's condition permits any investigation other than laparotomy.

As a matter of interest one would like to know Dr. Cammack's views on the medico-legal aspect of a case in which a surgeon treated, by conservative methods, a "perforated peptic ulcer", which turned out to be a perforated appendix, and the patient died.

Yours, etc.,

77 York Street,
Sydney,
March 27, 1952.

W. E. DAVID.

Congress Notes.

AUSTRALASIAN MEDICAL CONGRESS (BRITISH MEDICAL ASSOCIATION).

THE Executive Committee of the Eighth Session of the Australasian Medical Congress (British Medical Association), to be held at Melbourne from August 22 to 29, 1952, has sent the following information for publication.

Scientific Programme.

The arrangements for the scientific programme are well advanced, and on Tuesday and Wednesday, August 26 and 27, ten sessions will be conducted (two or three concurrently) on each morning and afternoon of those days. The following subjects will be discussed by panels of experts, including some overseas visitors: "Hypertension"; "Clinical Problems of the Menopause"; "A Review of Poliomyelitis"; "Uses of Cortisone and ACTH"; "Recent Advances in Infectious Diseases"; "The Mass Management of Burns"; "The Medical Care of the Aged"; "Diagnosis and Treatment of the Chronic Cough"; "A Review of the Antibiotics"; "Pruritus, General and Local".

On Thursday and Friday, August 28 and 29, sectional meetings will be held, and the programmes of the sections have been designed to appeal not only to specialists but to general practitioners. The programmes will include, *inter alia*, "Complications of Peptic Ulcer", "1000 Cases of Pelvimetry", a symposium on "Murray Valley Encephalitis", "Acute Abdominal Pain in Infancy and Childhood", "The Management of Thyrotoxicosis", and "Prematurity".

An exhibition of the latest advances in visual aids as applied to medical practice will be conducted by Mr. N. Rosenthal, B.Sc., Director of Visual Aids in the University of Melbourne, and on each day of Congress week between 12 noon and 1 p.m. documentary films will be shown in the Union Theatre.

Social Programme.

Members of Congress and their wives will be entertained during Congress week, and the wives of Victorian members will be hostesses at parties. In addition, the official opening and the President's Reception will be held at the Exhibition Building on the evening of Monday, August 25, and the Congress Dinner for members and their wives in the "Royale Ballroom" on Thursday, August 28; members of the Victorian Branch of the British Medical Association will be hosts at the Congress Ball on Friday, August 29. However, owing to limitations of space, it is regretted that the numbers attending both the dinner and the ball must be restricted, and early applications will receive preference.

Obituary.

KENNETH GEORGE McKAY ABERDEEN.

WE regret to announce the death of Dr. Kenneth George McKay Aberdeen, which occurred on April 8, 1952, at Cottesloe, Western Australia.

JANET MARCIA MORAY-LAWRENCE.

WE regret to announce the death of Dr. Janet Marcia Moray-Lawrence, which occurred on April 10, 1952, at Sofala, New South Wales.

Nominations and Elections.

THE undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Flaherty, James Aloysius, M.B., B.S., 1951 (Univ. Adelaide), 113 Sydenham Road, Norwood.

Perret, Lance Victor, M.B., B.S., 1951 (Univ. Adelaide), 7 Fisher Street, Tusmore.

The undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Marshall, Freda Mary, M.B., B.S., 1936 (Univ. Sydney), 5 Boambillee Avenue, Vaucluse.

Diary for the Month.

MAY 1.—South Australian Branch, B.M.A.: Council Meeting.
MAY 2.—Queensland Branch, B.M.A.: Branch Meeting.
MAY 6.—New South Wales Branch, B.M.A.: Organization and Science Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

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